

Final Report

Computer Needs Assessment

Ministry of Finance; Ministry of Trade, Tourism and Industry

SUBMITTED TO

U.S. Agency for International
Development

SUBMITTED BY

IGI International Inc.
Nathan Associates Inc.

UNDER

Guyana Building Equity and
Economic Participation Project
(BEEP)

Contract No.
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May 1996

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Ministry of Finance; Ministry of Trade,
Tourism and Industry

prepared by:

Douglas Lucius

Consultant, Nathan Associates Inc.

Guyana Building Equity and Economic Participation Project (BEEP)

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Executive Summary

This paper presents an overall approach for computerization within the Ministries of Finance (MoF) and of Trade, Tourism and Industry (MTTI) of the Government of Guyana. The approach is based on a needs assessment conducted in late April-early May under the BEEP project funded by USAID.

The approach of this paper takes into account the six facets of developing computer systems. These facets concentrate on more effective use of existing resources, and, also, on strategic improvements that increase the quality, quantity and timeliness of outputs and services over the long-term. As such, the facets consist of:

- Upgrading and expanding the current equipment base
- Rationalizing computer usage within offices of the ministries
- Improving the computers' environment to increase their longevity and productivity
- Training computer users on existing and new computer systems
- Developing links within and between offices for better information flows
- Developing new services and outputs

The results of the computer needs assessment is presented in the form of a long-term computerization plan (the "ideal" plan found on pages 23-26). Implementation of this plan, however, involves extensive planning, considerable financial resources, skilled manpower, and, to some extent, some trial and error in systems development. This paper consequently recommends applying BEEP resources to the basic or immediate computer needs of each ministry falling within the long-term plan. These needs are outlined in a practical computerization plan (found on pages 35-38).

The procurement list for the practical plan includes 2 Pentium servers, 36 Pentium PCs, 8 laser printers, 9 dot matrix printers, Windows software, statistical software, communications software, 8 modems, printer sharing devices, cables, as well as UPS, surge protectors and other measures to improve the computers' operating environment. Total cost is estimated at 500 thousand US dollars.

An action plan completes the paper by listing the activities needed to initiate and implement the practical plan. The action plan, indicating the responsible entity and time frame for each activity, may be found on pages 41 and the following.

Computerization of the Ministries: Overall Approach

This paper develops an overall approach for computerization within two ministries of the Government of Guyana: the Ministry of Finance (MoF) and Ministry of Trade, Tourism and Industry (MTTI). The approach is based on a needs assessment conducted in late April-early May under the BEEP project, funded by USAID.

This paper analyzes the computerization needs of the two ministries from a comprehensive perspective. It reviews the current computer stock and computing capabilities of each office or division falling under the purview of each ministry, and the potential for building on the equipment and skills base of each office in order to improve the quantity and quality of outputs.

Two time frames are explored for expanding the computer systems of each ministry, with the medium or long-term one encapsulating increased productivity, better communication and improved coordination amongst offices, and possibly between ministries, and the short-term or immediate one covering improved data processing within a single office, and possibly between two offices.

The longer time frame permits the implementation of an ambitious computerization program, built in stages and costing an estimated 500 thousand US dollars. The long-term program requires familiarity with a variety of systems, testing systems during the short term before replication, enhancing knowledge through continuous training, and enhancing computer equipment through continuous upgrading and rationalization.

The immediate, practical, plan concentrates on the computerization process the BEEP project can implement during the remaining 18 months of the project. It focuses on computing priorities within offices and ministries, and lays out the foundation for the long-term plan. The cost of the short-term plan is a bit difficult to judge, but the estimates are between 400 and 450 thousand in US dollars (see the Annex: "Needs assessment profiles.")

Current Computer Inventory

The following table lists the existing computer stock in the two ministries by office. Computers are simply described by processor or product line. Additional information on the computers--such as RAM or hard disk size, printers, power protection equipment, software and the like--is presented in Appendix IV.

Office	Responsibilities	Existing Computer Stock
DPU (Accountant General)	Accounts, Payroll, Budget, (Training)	1 x Mini Computer 1 x Novell Server (Account General) 21 x 486 PCs (Account General) 1 x Novell Server (Training) 14 x 486 PCs (Training)
Debt Management	Monitor Foreign Debt	1 x UNIX microcomputer 3 x IBM PS/2s (one w/ diskette problems)

Office	Responsibilities	Existing Computer Stock
Multilateral Financial Institutions	Report on Multilateral Debts and Grants	1 x 486 PC
Bilateral Financial Institutions	Report on Bilateral Debts and Grants	1 x 386 PC
Fiscal & Monetary	Fiscal Reporting Monetary Reporting Supervise Budget	2 x Pentiums 3 x 486 PCs
State Planning	Project Cycle Support for Enterprise Div. & other Ministerial Staff	1 x 486 Sever 6 x 486 PC 6 x 386 PCs
Enterprise	Monitor State Enterprises	1 x 386 PS/2
Macro Policy	Economic Analysis and Policy	1 x Pentium PC (lent from USAID)
IRD	DPU - Tax Form Processing. IRD Branch Office IRD LRO IRD Lamaha Street	1 x Minicomputer 1 x Pentium Server 15 x 486 PCs 3 x 486 PCs 1 x Pentium Server 7 x 486 PCs 1 x Pentium Server 8 x 486 PCs
Sec. to the Treasury	Administration & Clerical	1 x 386
Customs Dept.	Preparation of Customs Bills	2 x Pentium (UNIX) Servers 20 x Terminals 2 x 486 PCs
Statistics Bureau	Compile National Accounts, Census and other Statistics	2 x 486 PCs 8 x 386 PCs 2 x Laptop 4 x PS/2
Bank of Guyana	Research Other Departments	1 x Pentium PC 3 x 486 PCs 5 x 386 PCs 1 x 8086 PC 1 x 486 (UNIX) PC 1 x Novell Server 6 x 486 PCs 3 x 386 PCs; 6 x 486 PCs 15 x 386 PCs 5 x 286 PCs 1 x 8086 PCs; 7 x Laptops; 1 x System 36 Mainframe
MTTI (Headquarters)	General Admin.	1 x 486 PC 1 x 386 PC 3 x 286 PC
Industry Div. (MTTI)	Industry	1 x 386 PC
Consumer Div.(MTTI)	Consumer Affairs	1 x 286 PC 1 x 286 PC (not working)
Tourism Div. (MTTI)	Monitor & Promote Tourism	1 x 386 PC (broken)

Office	Responsibilities	Existing Computer Stock
GEPC	Export Promotion	1 x Pentium PC (on order)
GO-INVEST	Promote Investments	3 x 386 PCs
Bureau of Standards	Prepare Documents on Standards	3 x 386 (?) PCs

(Note: The Bank of Guyana's computer inventory is broken into two groups: one covering the Bank's Research Department, the other covering all other areas. This paper is principally concerned with the Research Department for two reasons: (1) it produces the data most relevant to the BEEP project, and (2) the Bank is a large specialized institution with many computers needs. An effort to do a needs assessment of the entire Bank would be a large undertaking in itself. This paper will refer to the Research Department from here on out, unless otherwise noted.)

Long-term computerization in the Ministries

There are six facets to developing computer systems. The first two address general improvements in computer systems and skills base that can increase the quantity, and sometimes the quality, of outputs. The next three facets cover more effective use of the existing resources and the last facet deals with new outputs or services, owing to new information technology. All facets, however, ultimately seek better data storage/retrieval, data analysis, and data delivery.

- ***Upgrading and expanding the current equipment base.*** This entails improving the computer resources of offices which use outmoded equipment and lag behind the others in terms of computerization.
- ***Training computer users on existing computer systems.***
- ***Rationalizing computer usage within individual offices.*** This involves the physical reconfiguration of computers via networks or cables to improve general access to shared devices such as printers.
- ***Developing links within and between offices for better information flows.*** This entails establishing cable and telecommunications links between different offices for the smooth and timely transfer of data.
- ***Improving the computers' environment to increase their longevity and productivity.*** This focuses on enhancements to the environment so that the computer equipment is stored in the cleanest, coolest, most electronically secure and theft-proof environment possible.
- ***Developing new services and outputs.*** This encompasses several specific hardware acquisitions--such as desktop-publishing systems, scanners, and the like--that can produce new output, as well as systems that can automate or enhance manual operations focused on such as file keeping, record-keeping and the like.

Each of these facets is discussed separately below in relation to perceived computerization needs within and among offices of each ministry.

Upgrading and Expanding the Computer Equipment

Computers must constantly be upgraded to achieve optimum performance over time. Two developments are at the root of the need for upgrading. First, manufacturers are continuously innovating and making improvements in hardware speed and capacity. That along with improvements in software result in equipment obsolescence within periods of four to eight years. Second, equipment failures tend to increase with age.

While inevitable, equipment deterioration can be greatly reduced by creating a proper operating environment (see relevant section below), and also by establishing in-house computer maintenance and repair facilities. The presence of an in-house maintenance staff is useful in overcoming the poor repair record of many suppliers (despite warranties) and allows for innovative ways of maintaining the equipment base (for instance, two failed machines can be pieced together into one working machine when failures are irreparable).

The computer upgrading and expansion needs of offices in both ministries generally fall into three categories:

1. Those office which have equipment so old it should be replaced, i.e.,
 - Debt Management (MoF)
 - Bilateral Division (MoF)
 - Statistics Bureau (MoF)
 - MTTI Headquarters
 - Industry Division (MTTI)
 - Consumer Division (MTTI)
 - Tourism Division (MTTI)
 - GO-INVEST (MTTI)
 - Bureau of Standards (MTTI)
2. Those offices without equipment or whose equipment is inadequate for current computing requirements; the current equipment base should be enlarged to improve the quality and, hopefully, quantity of office outputs, i.e.,
 - The Secretary to the Treasury (MoF)
 - Enterprise Division (MoF)
 - IRD (MoF)
 - GEPC (MTTI)
 - State Planning is a case apart from the others in this category. It has some quite good computers, but should at least upgrade its server and expand its network to include the Enterprise Division, the Secretary to Treasurer's secretary, and a few other single PCs located nearby so that the users can enjoy the full services of the network already in place.
3. Those offices whose equipment is adequate for current data processing needs but whose equipment base could be increased to improve work flows and outputs. These special cases consist of:
 - DPU (Accountant General)

- IRD's Data Processing Unit,
- IRD's Branch Offices

In most cases, upgrading implies expanding or replacing existing computer equipment with the most recent models to ensure the most longevity possible (i.e., Pentium machines with large hard drives running Windows 95). However, for those offices which are lagging behind others in the ministry with respect to computerizing, upgrading could mean installation of previously-used personal computers, donated by offices acquiring newer models. Budgetary considerations are the main reason for shifting computer resources among offices, following data processing priorities. (Appendix VI, "Stratagem for 'Handing-Down' Computers," provides guidelines for re-allocating used but usable resources based on the recommendations made in this paper for replacing equipment. The stratagem depends upon (1) Ministries' approval of all recommendations made; (2) willingness of select offices to part with their older PCs; and (3) willingness of select offices to accept such equipment.)

The following table provides the plan for replacing and expanding computer resources in both Ministries. It is important to note that not all offices in the Ministries require new or additional equipment. The second column in the table lists the existing personal computers that either need to be replaced or need to be enhanced with additional hardware. The third column lists the number and sort of PCs which will be used to replace the old equipment in the previous column. The last column lists the PCs that will incrementally expand (rather than replace) computer resources.

Upgrading and Expanding the Computer Equipment

Office	Existing Equipment	Replacement Equipment	New Equipment (Expansion)
DPU (Accountant General)	Mini Computer 2 Servers 35 486 PCs		14 x 486 PCs
Debt Management	UNIX System (386) 2 old PCs, one w/ diskette drive problems	New UNIX System: Pentium w/ 2 GB Hard Drive, Tape Back-Up, Software 3 x Pentiums w/ Windows 95	
Bilateral Financial Institutions	1 old PC, bad printer	1 x 486 w/ Windows 3.1 Dot Matrix Printer	
State Planning	Network Server: 486 w/ 10-user Novell license	Replace Server w/ Pentium; 10 - to 25-User Upgrade	
Enterprise	1 old PS/2	2 x Pentium PC w/ Window 95	2 x Pentium PC w/ Window 95
IRD	Many new PCs, very busy		4 x 486 PCs; 2 NIC Cards
Sec. to the Treasury	Secretary to the Secretary	1 x 486 PC	
Statistics Bureau	16 PCs, of which 4 <i>quite</i> old; 8 more rather old	4 x Pentium w/ Windows 95	
Bank of Guyana (Research)	10 PCs; of which 4 - 6 old; 1 x 486 Server	5 x Pentium w/ Windows 95 2 x CD ROM Drives 5 x NIC Cards; 1 x Pentium Server	Special Software: SPSS, Economic Modeling, Mathematical Modeling 1 x Laser Printer 1 x Dot Matrix
MTTI (Headquarters)	4 old PCs 1 486 PC	4 x Pentium w/ Windows 95	New Software

Office	Existing Equipment	Replacement Equipment	New Equipment (Expansion)
Industry Div. (MTTI)	1 small PC	1 x Pentium w/ Windows 95	
Consumer Div. (MTTI)	1 old PC 1 broken PC	2 x Pentium w/ Windows 95	
Tourism Div. (MTTI)	1 broken PC	2 x Pentium w/ Windows 95	1 x Laser 1 x Dot Matrix Special Software (Graphics, SPSS...)
GEPC	1 Pentium PC		3 x Pentium PCs w/ Windows 95 1 x Laser Printer 2 x Dot Matrix Printers
GO-INVEST	3 PCs, working poorly	3 x Pentium w/ Windows 95	2 x Pentium w/ Windows 95 2 x Laser Printers 4 x Dot Matrix Printers
Bureau of Standards	3 PCs, working poorly	3 x Pentium w/ Windows 95	2 x Laser Printers

Specific software packages are mentioned in the table above to underscore the need for a comprehensive approach to equipment upgrading. In addition to accounting, economic modeling and other specialized software, the ministries should upgrade to Windows or Windows 95 and acquire corresponding versions of spreadsheet, word-processing, and database software.

There is a need to upgrade many of the computers in the Bank of Guyana's Research Department, including its server. These recommendations come partly from the reasons listed above and applying to other offices. The recommendation on the server comes partly from the desire to improve the research department as part of the macro database link (see below.)

It would be wise to order the same models of all equipment and components as much as possible so that all consumables are transferable (e.g. all dot matrix printers should be Epson 1170s or some other brand, as long as all machines take the same ribbons.) For that matter, some attention should be paid to the existing computer stock: consumables will best be purchased for existing as well as new equipment. That may make some difference in the sort of computer equipment which must be purchased in the future (e.g. continue purchasing Hewlett Packard laser printers.)

Rationalizing Computers: Networking and Printer Sharing

Rationalization refers to optimizing the arrangement of computers within offices in order to improve access to shared resources like on-line data or printers, software or data. There are basically two ways to rationalize: (1) use cables and printer sharing devices to facilitate the sharing of hardware, and (2) network to facilitate the sharing of software and data, as well as hardware. The first option is a less expensive and less sophisticated response to rationalization. It does not resolve the awkwardness of sharing data via diskette (i.e., copying files to diskette, and passing the diskette on to the next user).

To a great extent, though, the choice between options is dictated by staff capabilities in place to handle the rationalization process. Network administration and maintenance require skilled manpower. Networks are difficult to install. Printer-sharing devices are quite straight-forward.

Sharing information between offices, even between ministries, is discussed below under links. It must be stressed here, though, that computers *within* the offices which are to be important original sources of data for ministry-wide databases (like the macro database in the MoF and the trade database in MTTI) should be networked. Centralizing the data within each office is a logical step towards easy transmission to outside users.

The table below highlights the rationalization needed by offices in both ministries. In certain cases, the current network arrangements are adequate and no further rationalization is required.

Rationalizing Computers: Networking and Printer Sharing

Office	Existing Arrangement	Rationalization Needed
DPU (Accountant General)	Novell Network	No rationalization required
Debt Management	UNIX Stand-Alone Stand-Alone PCs	Use Printer Sharing Device & Cables
Fiscal & Monetary	Creating own Network	Rationalization in progress
State Planning	Novell Network	Expand Network to F&M, Enterprise, & Macro
Enterprise	One PC	Connect to State Planning (after Acquiring PCs)
Macro Policy	None	Establish Network (after Acquiring PCs)
IRD	Novell Networks (Model Links w/ Branch)	No rationalization required
Sec. to the Treasury	None	Use Printer Sharing Device & Cables (after Acquiring PCs)
Customs Dept.	UNIX Networks	No rationalization required
Statistics Bureau	Stand-Alone PCs	Establish Network to Share Printers & Data
Bank of Guyana (<i>Research</i>)	Networks, Stand-Alones and Mainframe	Upgrade Network in Research
MTTI (Headquarters)	Stand-Alone PCs	Upgrade PCs and Network at Same Time (Acquire Server)
Industry Div. (MTTI)	One Working PC	(Upgrade PC)
Consumer Div. (MTTI)	One (Working) PC	(Acquire PC)
Tourism Div. (MTTI)	Stand-Alone PCs	Upgrade & Connect to MTTI Network
GEPC	One PC	Use Printer Sharing Device & Cables (after Acquiring PC)
GO-INVEST	Stand-Alone PCs	Upgrade PCs Use Printer Sharing Device & Cables
Bureau of Standards	Stand-Alone PCs	No rationalization required

Special attention should be paid to the State Planning Division; its network should be expanded so that the computers of the Enterprise and perhaps the Project Cycle Offices are connected in one complete network. This will allow these small but important offices to share resources such as printers.

Improving the Computer Environment

The ideal environment for computers is a cool, hermetically sealed room similar to the factories in which they were built. Anything less risks damaging or contaminating sensitive microscopic and heat-sensitive components. Basic measures for creating an appropriate environment include:

- Back-Up generators for long power outages
- Air conditioners to cool and ventilate facilities
- Proper housing to protect against dust
- Surge protectors to ensure a constant flow of electricity
- UPSes to protect computers against power loss, drops in power, spikes and surges
- Re-arrangement of equipment and re-wiring of rooms to limit interference from large power-consuming machinery
- Scheduled cleaning of computer equipment, especially diskette drives
- Bars on windows, possibly alarms to protect against thefts

Finally, an electrical engineer should be contracted to do an audit of all existing facilities and see that the rooms are well wired, interference is low, and so on. Based upon the engineer's recommendations, some equipment should be moved, rooms re-wired, and so on.

The following table is a check list of the basic changes needed by offices to achieve the best environment. For instance, it is alarming to observe the number of computers in the MTI headquarters with no UPS and/or no stabilizer. There are no back-up generators and computers are arranged in an awkward manner, often in offices without air-conditioning. One suspects a great deal of interference and damage caused by placing computers on the same electrical phases as air conditioners and photocopy machines. Bilateral division also has poor power and operates with windows and doors wide open, admitting a considerable amount of dust. In the second and third columns of the table, a distinction is made between power protection devices (like UPSes and surge protectors) for the "*Present*" or current stock of equipment, and for "*New*" computers (yet to be purchased).

Improving the Computer Environment

Office	Environmental Improvement Needed	Recommended Acquisition
DPU (Accountant General)	Power Protection: <i>Present</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator: DPU Back-Up Generator: Training Electrical Audit and Recommended Adjustments Doors, Bars on Windows Alarm System Cleaning Supplies
Debt Management	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 1 x UPSes 5 x Surge Protectors Electrical Audit and Recommended Adjustments Bars on Windows Alarm System Cleaning Supplies
Multilateral Financial Institutions	Power Protection: <i>Present</i> Remodeling Facilities	Back-Up Generator 1 x Surge Protectors Electrical Audit and Recommended Adjustments

Office	Environmental Improvement Needed	Recommended Acquisition
	Cleaning Schedule	Cleaning Supplies
Bilateral Financial Institutions	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 1 x UPS Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows Cleaning Supplies
Fiscal & Monetary	Power Protection: <i>Present</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
State Planning	Power Protection: <i>Present</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 1 x UPSes 4 x Surge Protectors Electrical Audit and Recommended Adjustments Doors, Bars on Windows Cleaning Supplies
Enterprise	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 2 x UPSes 2 x Surge Protectors Electrical Audit and Recommended Adjustments Windows Cleaning Supplies
Macro Policy	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 5 x UPSes 5 x Surge Protectors Air Conditioning (Secretary & Assistant) Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
IRD	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities	Back-Up Generator 10 x UPSes 5 x Surge Protectors 4 x UPSes 4 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Alarm System (DPU)
Sec. to the Treasury	Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 6 x UPSes 6 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
Statistics Bureau	Power Protection: <i>Present</i> Power Protection: <i>New</i>	Back-Up Generator 6 x Surge Protectors 4 x UPSes

Office	Environmental Improvement Needed	Recommended Acquisition
	Remodeling Facilities Cleaning Schedule	4 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Alarm System Cleaning Supplies
Bank of Guyana (Research)	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 5 x UPSes 5 x Surge Protectors Electrical Audit and Recommended Adjustments Bars on Windows, Alarm System Cleaning Supplies
MTTI (Headquarters)	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 5 x UPSes 5 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
Industry Div. (MTTI)	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 1 x UPSes 1 x Surge Protectors Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
Consumer Div.(MTTI)	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 2 x UPSes 2 x Surge Protectors Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
Tourism Div. (MTTI)	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 2 x UPSes 2 x Surge Protectors Air Conditioning (Others: Part of MTTI) Cleaning Supplies
GEPC	Power Protection: <i>Present</i> Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 1 x UPSes 1 x Surge Protectors 3 x UPSes 3 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Alarm System Cleaning Supplies
GO-INVEST	Power Protection: <i>Present</i>	Back-Up Generator 3 x UPSes 3 x Surge Protectors

Office	Environmental Improvement Needed	Recommended Acquisition
	Power Protection: <i>New</i> Remodeling Facilities Cleaning Schedule	2 x UPSes 2 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies
Bureau of Standards	Power Protection: <i>Present</i> Remodeling Facilities Cleaning Schedule	Back-Up Generator 3 x UPSes 3 x Surge Protectors Air Conditioning Electrical Audit and Recommended Adjustments Doors, Windows, Bars on Windows Cleaning Supplies

Notes:

- (1) "Cleaning Supplies" consist of diskette-cleaning equipment, screen wipes and so on.
- (2) "Remodeling facilities" covers installing air-conditioners, replacing windows and doors, installing bars on windows, installing alarms and the like.
- (3) "Electrical Audit and Recommended Adjustments" alludes to the electrician's audit, which will determine the need for moving equipment and re-wiring rooms to minimize electrical interference

Training Computer Users

Training is a necessary adjunct to computerization. Training encompasses a wide range of topics from software applications, database and statistical programming, to network administration.

At present, computer users in both ministries tend to display initiative but few computer skills. Computers lay idle in some offices because staff do not have the necessary training to run elementary software packages. Computer-support staff (in the Accountant General's DPU, State Planning and MTTI headquarters) are hopelessly stretched. A few Novell Networks already exist, and many more are envisioned, but networks require well-trained staff for their proper administration and maintenance. Additional networks will require additional staff trained in their proper operation and use.

Unfortunately, this statement of the obvious must be tempered by the realization that there has been a recent history of civil servants moving to the private sector once they acquire basic computer skills. The ministries are therefore reluctant to provide training.

The approach to training arising from a strong need for qualified personnel on the one hand, and a fear that trained personnel will be "poached" on the other, leads to a delicate strategy. Though not formalized, the strategy seems to be "provide all potential users with basic skills; limit advanced training to a few proven and loyal individuals who will administer networks and support users in basic tasks."

There is the additional concern that training takes staff away from their normal duties and disrupts work flow. While true, the immediate loss of productive hours during training programs should be more than compensated by increased productivity over the long-term. Whatever the

case, training can be accommodated by financing staff who attend after-hours training in an outside computer training institute (of which there are several in Georgetown.)

Windows and Windows 95 will be the dominant operating system after upgrading and expanding the computer systems. Most office staff will need Windows, Windows word processing, and Windows spreadsheet training.

In addition, a select group of line staff would be best served by database and communications software training. Lastly, another subset of line staff would require training in specialized systems. Examples of advanced skills training are:

- Netware Server: Novell Netware Skills
- Quality Publications: Desktop Publishing Skills
- Macro Database: Database Management Skills
- Public Service: Simple Database or Spreadsheet Skills

Links: Macro Database, Trade Database and Other

Links in the context of this paper are cable and telecommunications connections *between offices*. Linked offices (with one exception, Debt Management's UNIX stand-alone) will be networked internally, usually for the purpose of data sharing¹. As almost all existing networks in the ministries are Novell, the new inter-networks should be Novell too.

Inter-office cable and telecommunications have many useful applications, such as easy access to remote offices and prompt exchange of electronic mail or data. Examples of useful inter-office links for specific purposes include:

- Bank of Guyana with commercial banks for financial data (interest rates, foreign exchange rates, daily statements).
- Debt Management with the Research Department of the Bank of Guyana UNIX systems for sharing CS-DRMS debt data.
- Accountant General's DPU with Budgeting for better flows of accounting information.
- DPU - Processing Unit with DPU's training cell.
- Multilateral section with IDB and other such institutions for loan statements and the like.
- GO-INVEST with other MTTI offices relying on a centralized desktop publishing cell.
- GEPC and GO-INVEST can both do promotional work and research via the Internet.
- MTTI's Industry Section with MoF's Fiscal & Monetary, and Enterprise Divisions for much of the macro data: investment, infrastructure and business performance.

The most important and long-term inter-office links are the following three:

- Bank of Guyana (Research), Statistics Bureau, Debt Management Division, Enterprise Division, Customs Department, Inland Revenue Department, Macro Policy Division for the Macro Database;

¹ For a discussion of networking computers within offices, see "Rationalizing Computers: Networking and Printer Sharing."

- Bank of Guyana (Research), Statistics Bureau, Debt Management Division, Enterprise Division, Customs Department, Inland Revenue Department, Macro Policy Division for the Trade Database; and
- MTTI headquarters to its external Agencies for a wide area network (“WAN”)

Macro Database

The macro database will allow key individuals, including the Minister of Finance, to have easy and timely access to all important social, national accounts, trade, finance, monetary and other economic data. The Macro Policy Division will be the center for the macro database. Its computers will be linked to other offices assembling the original data. The Macro Policy division will be able to view the data on specially designed “screens” and possibly “down-load” it from other office’s databases into the macro database.

The inter-office computer links for the macro database will be cable in some cases, telecommunications in others. Cable is the easiest, highest volume and most reliable medium to connect computers, but is only practical over short distances. Cable will link offices within the MoF’s headquarters (like the Debt Management Division and the Enterprise Division; as well as Macro Policy and the Minister.) To reach offices outside of MoF’s headquarters, the links will be in the form of modems and telephone lines (i.e., from MoF headquarters to Bank of Guyana, Statistics, Customs, and Inland Revenue).

The macro database is an ambitious plan. Once the MoF feels prepared to develop a macro database, a committee with representatives of all concerned parties should be formed to gain a consensus on the nature of the database, the links, and other details. Committee members should consider whether to create a single “Macro Database Server” on a single centralized computer that would provide data in a summarized form; or distribute data across several servers, each in a different office. The committee would also need to consider format, ability to update data on remote machines, security measures, agreement on standards, and the like. These issues are introduced in Appendix VIII: “Linking Computers for Data Exchange: Some Issues”: these and other issues should be discussed with a qualified telecommunications and transmission expert.

Trade Database

Given the implicit depth and breadth of the macro database, the trade database is likely to be a subset of the macro database. The trade database would contain all data relevant to MTTI: imports, exports, tariff rates, infrastructure, investment and so on. The only addition to the trade database over the macro database would be tariff rates (which are already on the Customs Department’s computers and can be easily moved to the trade database computer.)

The trade database would work in basically the same way as the macro database. To avoid an elaborate duplicate system for data collection and data transmission, MTTI should rely upon the macro policy division for trade data. The favored mechanism for data transmission between the two databases would be a single server in MTTI that would copy all relevant data from the macro database, store it and then serve it in turn to all relevant MTTI bodies. (The alternative would be various MTTI offices tapping into the macro database and directly collecting all needed data.) Again, this and other questions should be addressed by a committee comprising all interested parties.

MTTI WAN

Special attention should be placed upon the desire to improve communications between the MTTI headquarters office and its outside agencies: GEPC, GO-INVEST and Bureau of Standards. After all, many more people work in these agencies than do in the headquarters building. Such links would essentially be a wide-area-network, or “WAN.” Communications between offices would be enhanced by installing modems, communications software, an electronic mail (“email”) package and an electronic bulletin board/conferencing software (such as Lotus Notes) at MTTI headquarters and at each of the three agencies.

The ideal configuration of the WAN would be a network covering the three divisions in MTTI’s headquarters; these offices would in turn have access to outside agencies via modem. In addition, the WAN could have full-time multi-point telecommunications links allowing round-the-clock access to all networked parties. Other issues deserving further thought include:

- Can the telecommunications system in Guyana support full-time (leased-line, or variations of leased-line) communications?
- How would headquarters hook up three modems (for the three outside agencies) to one network? A multi-point link perhaps?
- What sort of burdens does that place on the computer system in MTTI headquarters and its outside agencies?

The three links discussed above (the macro database, the trade database, and the WAN) are appealing but very ambitious efforts that cannot be accomplished in the near-term. However, the ministries can take steps now to implement scaled-down versions of the links, thus laying the ground work for such links over the long-term. Initial steps include:

- Training or hiring a database manager to compile and maintain a cogent centralized macro and trade database.
- Locating the database specialists needed to develop the programs allowing users from remote computers to access and read data.
- Locating specialists required to set up the telecommunications equipment, establish data-sharing links, and train all concerned.

All these contracted specialists will train line staff in the use of telecommunications software and accessing the data from remote locations.

The following table lists different links and identifies the sorts of software and hardware which each option requires. The subsequent pages provide graphic illustrations to help the reader better understand where all these links are.

Links: Macro Database, Trade Database and Other

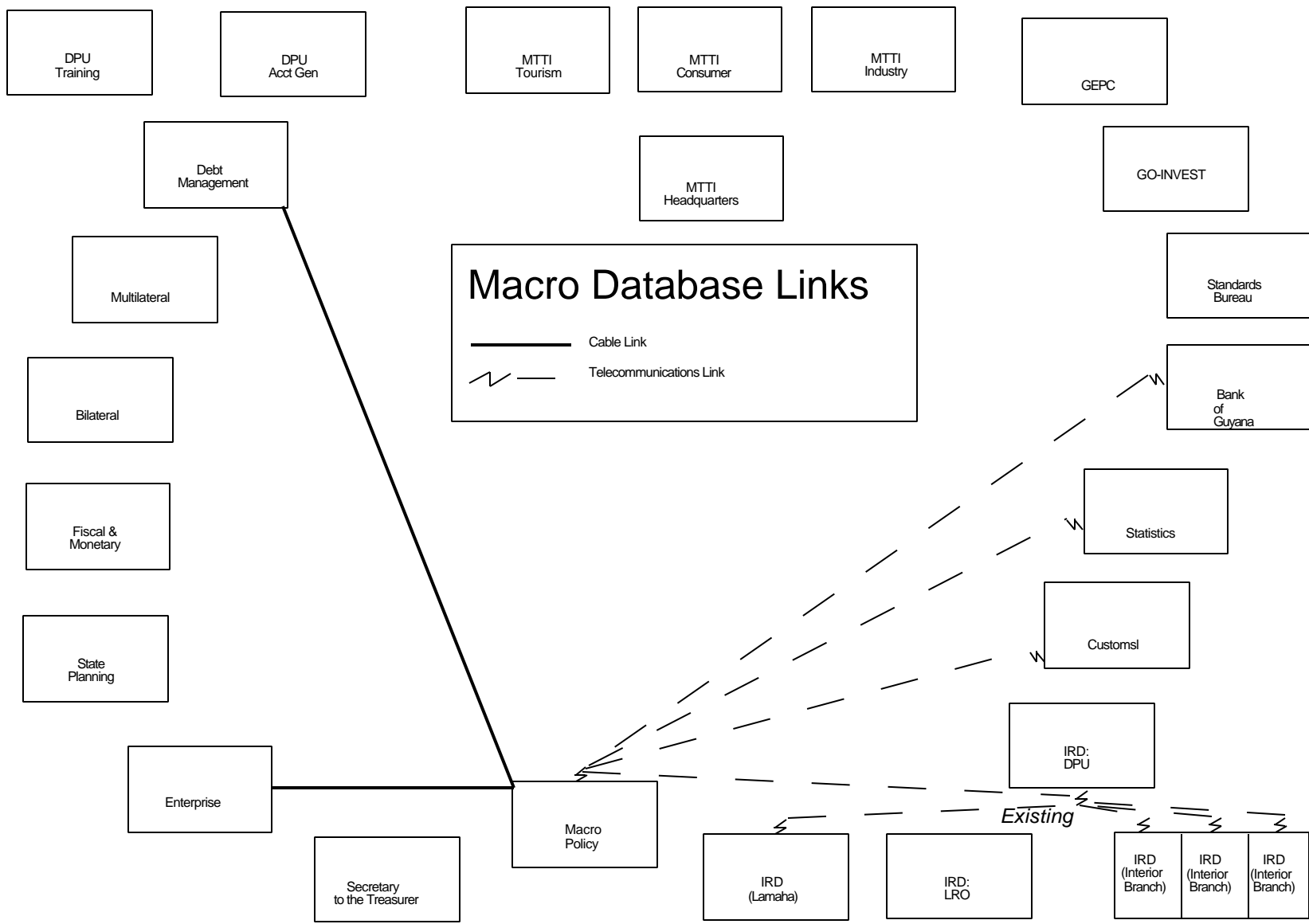
Office	Links Proposed	Necessary hardware
DPU (Accountant General)	Accounting to Training Accounting to Budgeting Accounting to F & M	Cable & Repeater “ “ “ “ “ “
Debt Management	Debt to B of G Research Link to Macro Policy	Modem & Communications Software Novell / UNIX Interconnectivity Software
Multilateral	Links to IDB, IBRD...	Modem & Communications Software
Fiscal & Monetary	Accounting to F & M	Novell (Cable & Repeater Listed above)
Enterprise	Industry to Enterprise Macro Database	Modem & Communications Software Cable
Macro Policy	Macro DB: Enterprise Macro DB: Debt Mgmt Macro DB: IRD's DPU Macro DB: Customs Macro DB: Statistics Macro DB: BoG Research	Cable Cable & Repeater Modem & Communications Software “ “ “ “ “ “ “ “ “ “ “ “
IRD	Macro Database	Modem & Communications Software
Customs Dept.	Macro Database Industry to Customs GEPC to Customs GO-INVEST to Customs	Modem & Communications Software Novell / UNIX Interconnectivity Software Modem & Communications Software Novell / UNIX Interconnectivity Software Modem & Communications Software Novell / UNIX Interconnectivity Software Modem & Communications Software
Statistics Bureau	Macro Database GO-INVEST to Statistics	Modem & Communications Software “ “ “ “
Bank of Guyana	Debt to BoG-Research Macro Database BoG to Commercial Banks	Modem & Communications Software “ “ “ “ “ “ “ “ (Possible Financial Software, too)
MTTI Headquarters	Communicate w/ Agencies	Modem & Communications Software email and Electronic Bulletin Board
Industry Div. (MTTI)	Industry to Customs Industry to M & F Industry to Enterprise	Modem & Communications Software Novell / UNIX Interconnectivity Software Modem & Communications Software “ “ “ “
Consumer Div. (MTTI)	Desk-Top Publishing	Modem & Communications Software
Tourism Div. (MTTI)	Desk-Top Publishing	Modem & Communications Software
GEPC	GEPC to Customs Communicate with HQ	Modem & Communications Software “ “ “ “ email and Electronic Bulletin Board
GO-INVEST	Desk-Top Publishing GO-INVEST to Customs Communicate with HQ	Modem & Communications Software “ “ “ “ “ “ “ “
Bureau of Standards	Desk-Top Publishing Communicate with HQ	Modem & Communications Software “ “ “ “ email and Electronic Bulletin Board

Notes:

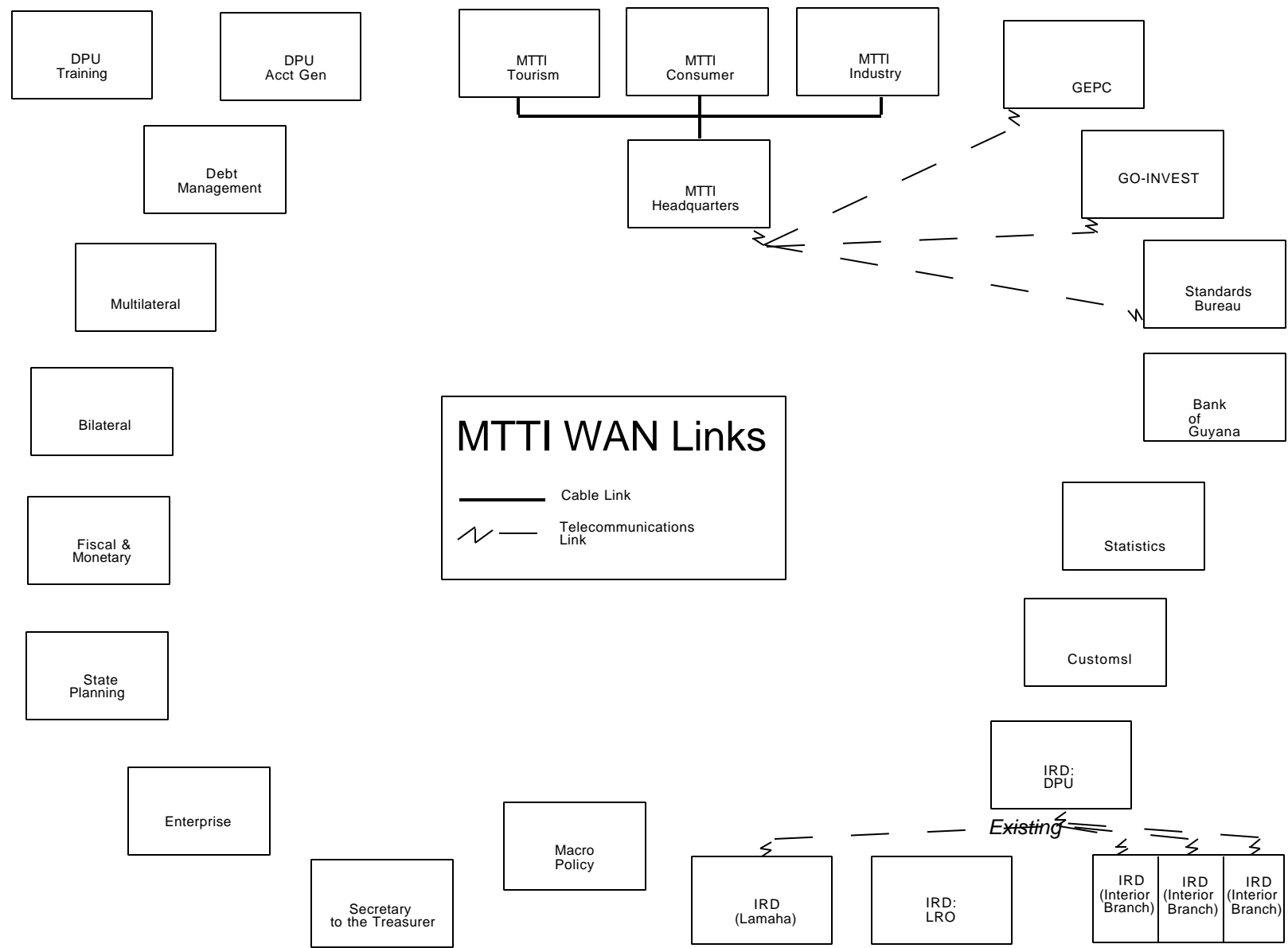
(1) A repeater is needed when stretching cable over long distances

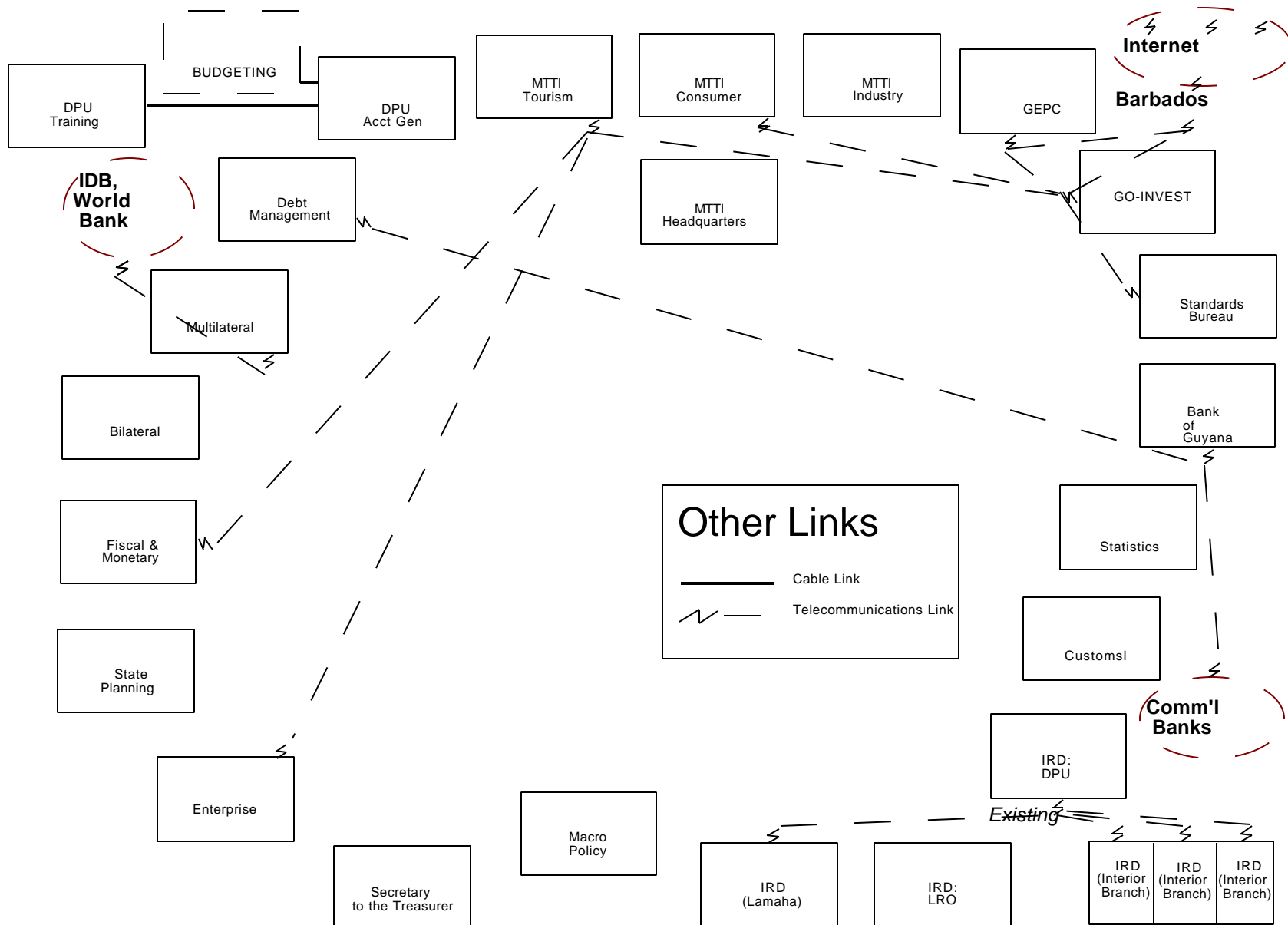
(2) Requirements (e.g. "Modem & Communications Software") are repeated for each, but that does not imply that goods must be purchased repeatedly in each case. One specified acquisition will be sufficient for the different needs. For

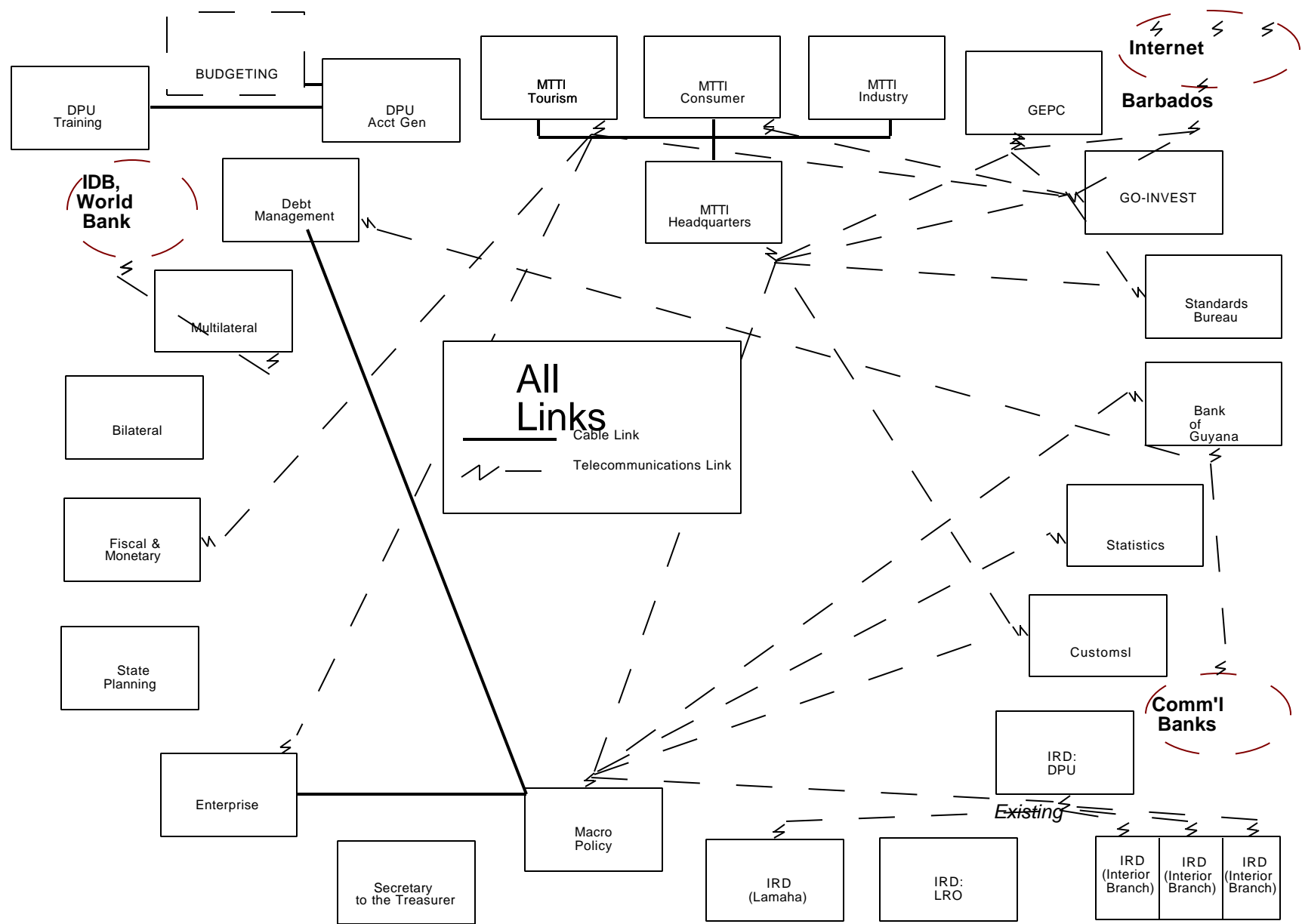
example, the Industry Division at MTTI would require one set of modem and communication software (even though that phrase appears three times), plus one Novell to UNIX interconnectivity software package. Whether used for one, two, three, or maybe even more purposes, one set of modem and communications software is all that is required.



{ EMBED Word.Picture.6 }







Developing New Services and Outputs

There are some desirable outputs and services which can not be produced now due to gaps in the existing computer stock. For instance, there is at present only one system for drafting *quality publications*, and it is in the Bank of Guyana's Research Division. Meanwhile there are several offices in MTTI which could benefit from desk-top publishing in their promotional work, and even have a few people trained in this specialty. Ideally, all these office will have powerful PCs with large monitors, scanners, and quality color laser printers. Other examples include:

- Debt Management would like to store loan agreements in computer files and search them in electronic form. This operation would be possible with scanners.
- The Treasury needs to organize their personnel or "Public Service" files; and their concessions business in an effort to identify double (i.e. fraudulent) claims. These operations entail two simple computer systems. (The Treasury might also set up a slightly more complicated petrol monitoring system to patrol people making false petrol invoices: record the quantity and quality purchased, along with the vehicle number and odometer reading and study to see which vehicles do not seem to have consistent kilometers per liter of petrol. However, the Secretary did not seem very interested.)
- The Macro Policy Division has no personal computers now (other than one on loan from USAID) and needs to acquire several for various operations. To start, the Division needs computers to process data for decision-making (one PC) and prepare reports for external circulation (another PC). The Division also needs a computer for compiling a historical database that would serve as the prototype for the macro database (a PC will be needed for the specialist brought in to transfer the historical data from tapes and diskettes and put it in a standard format.) Lastly, the Division can improve data-sharing between staff (i.e., the specialist and Division head) and the Minister of Finance via the network. (This implies procuring another PC.)
- The Bank of Guyana has a fairly well developed computer system and enormous scope for expansion and reorganization of their computer facilities. However, many possible improvements in the Bank--like corporate database development, automated daily statements from commercial banks, money market / currency information, supervisory activities--are beyond the scope of the BEEP project. The main concern of the BEEP project is to upgrade the computer operations of the Bank's Research Department so as to streamline data access to the macro database. But, this need should not be considered in isolation. It would be best that a detailed systems analysis and strategic plan be prepared for the Bank of Guyana as a whole.

The following table highlights the sorts of computer systems needed to produce new outputs and services.

Developing New Services and Outputs

Office	Specific Output / Service	Equipment Required
DPU (Accountant General)	(On-Going)	(On-Going: see DPU's Own Recommendations)
Debt Management	Read Large Databases Quality Output Scanning Documents	CD ROM Laser Printer Mixed Scanner System
Macro Policy	Macro Database (for Improved Analytic Ability)	Server 4 Pentium PCs Trained Database Specialist Laser High-Speed Dot Matrix Printer
IRD	Scanning Tax Form	Full Scanner System, Optical Drive
Sec. to the Treasury	Public Service Files Concessions Records	3 "Hand-Me Down" PCs 1 x 486 PCs
Statistics Bureau	Quality Publications Collect Field Data Geographic Inf.' Services	Desktop Publishing System Portable PCs or Personal Data Assistants Training, Improved Hardware & Software
Bank of Guyana	<i>Many</i>	Systems Analysis
MTTI (Headquarters)	Computerized Expenditures Registry TRANS and other Large Databases	Accounting Software PC with Database / Spreadsheet Software CD-ROM Drive
Industry Div. (MTTI)	Trend Analysis	Database, Statistic & Graphic Software (And Access to Macro Database)
Consumer Div. (MTTI)	Quality Publications Database of Standards	Desktop Publishing System Link-Up With Standards Bureau; Database Software
Tourism Div. (MTTI)	Quality Publications	Desktop Publishing System
GO-INVEST	Quality Publications Improved Analytic Work Internet & WWW	Desktop Publishing System Software (& Training) Telecommunications Link & Account
Standards	Scheduling Meetings Graphic Illustrations Quality Publications	Scheduling Software Graphics Software Desktop Publishing System

One very important need to fulfill (or at least attempt to satisfy) are consumables. While not a new service or output, consumables deserve special attention, and this part of the document seems the best place to mention their role in computerization. All computers require consumables — diskettes, printer ribbons, toner cartridges and other supplies which are soon exhausted and must be replaced — to function smoothly. Some offices are all set up with the proper hardware and software (e.g. tape drive and back-up software), but cannot utilize them because the consumables (e.g. tapes) have been exhausted and are expensive to replace. Any expansion of computer systems must account for the need for consumables (and if they can be purchased overseas with donor funding, the savings are remarkable.) Once the practical computerization plan is drawn up, estimates of the consequent consumables will be made. Each office will be allotted their needed consumables. Also, the BEEP project office should have an extra store of consumables to accommodate any shortfalls.

Insert ideal, page 1 – Not Provided By Originating Office

Insert ideal, page 2 – Not Provided By Originating Office

Insert ideal, page 3 – Not Provided By Originating Office

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insert ideal, page 4 – Not Provided By Originating Office

The Ideal Plan for Computerization of the Ministries

The result of the MIS needs assessment are summarized in the table found on pages 22-25. The needs of both ministries fall into 5 categories. Basic hardware and software requirements are shown in the first 4 categories (i.e., columns 2-5 of the table) and ancillary improvements designed to extend the longevity of the computer equipment are listed in the fifth category (column 6). The next section of this paper prioritizes these needs and sets forth an action plan for immediate implementation under the BEEP project.

Short-term Computerization within the Ministries

Establishing comprehensive computer systems takes time, extensive planning, considerable financial resources, and well trained manpower. As such, the long-term computer needs of the ministries outlined on pages 22-25 cannot be addressed all at once, but, rather by systematic development of human and equipment resources in a logical sequence. The criteria for establishing the proper sequence of measures include:

- Concentrating on laying the foundations of the comprehensive computerization program (or ideal plan) for the two ministries and allowing for further developments over the medium- and long-term.
- Eliminating superfluous elements from the comprehensive program.
- Considering institutional capacity to absorb expanded or new systems.
- Relying on shared resources.
- Identifying funding resources in addition to the BEEP project to sustain the computerization process over the medium- and long-term.

These criteria are discussed in greater detail below, after which the discussion will turn to what the results imply for each office.

Laying the Foundation of the Comprehensive Computerization Program

The main elements or foundations of the comprehensive, ideal computerization plan for the ministries are:

- providing the ministries with adequate equipment for timely execution of basic services, and, when possible, new services with important impacts on beneficiaries
- providing the ministries with adequate equipment for improved data collection, storage and analysis to support decision-making, and most, importantly,
- limiting waste and mistakes by addressing primary needs first, and addressing secondary needs through systematic programs for new systems and linkages designed to improve the exchange of information.

These elements imply developing the system gradually. For example, the macro database, trade Database, MTTI WAN and the other links described in the comprehensive, ideal system are large and involve several stages of development. It is best for both ministries to gain experience working with a skeleton

version of such systems, appreciate better what is involved in creating more links, and have a smoother development over the medium- and long-term.

For the macro database, the stages would be:

1. ***Establish a macro database as it envisioned above, but without the telecommunications links.*** That is, the Macro Policy division should have a server, and a group of PCs on a small network² and use the data for analysis. A trained database assistant will go about collecting data from different offices and compiling it on the server. At this stage, the only missing element would be the cable and telecommunication links providing speedy access to other machines in offices external to the Macro Policy Division.
2. ***Make macro data available through the network to users in the macro policy office.*** The data specialist will allow users in the macro policy office to access and download data from the server into their applications and files.
3. ***Establish a single telecommunications link between the two largest sources of data for the macro database,*** the Statistics Bureau and Bank of Guyana's Research Department. The Statistics Bureau must be already networked and must have at least created a complete database of indicators on one machine (preferably the network server).
4. ***Establish additional links with other offices, once the problems in linking the Statistics Bureau and the Bank of Guyana's Research Department are ironed out.*** Building upon the experience of the link between the Statistics Bureau and the Bank, and taking advantage of up-coming technologies, the ministry can supervise the installation of the remaining links (i.e., between Macro Policy and MTTI offices, Customs, Debt Management, Enterprise, and IRD).

For the trade database, much will rely upon the macro database. All trade data is stored in the macro database. So the issues become a matter of (a) copying the data stored in the macro database, and (b) serving it to interested parties in MTTI. For the trade database, the stages would be:

1. ***Provide assistance in creating the macro database:*** lend materials or personnel to the macro division while it builds the macro database on one personal computer.
2. ***Copy the data to the MTTI server:*** The MTTI computer personnel will visit the macro policy division, copy desired data using tape (or perhaps other mass storage media), and copy from tape to the MTTI server's hard disk.
3. ***Make the trade data available to users on the MTTI headquarters network.*** Mimicking the programs developed on the macro database (above, stage 2), the MTTI computer personnel must provide a service allowing headquarters' users to easily download data from the server.
4. ***Provide copies on tape to outside agencies:*** Upon request, the data specialist should copy trade data from the server on to tape and deliver it to GEPC, GO-INVEST and perhaps the Standards Bureau. This will often require changing the file format (e.g. from Fox Pro to Lotus 1-2-3.)

² One of the networked PCs would be in the Minister's office.

5. ***Establish links to outside agencies:*** Develop a system allowing users in outside agencies to tap into the MTTI headquarters network and download the data over telephone lines (The outside agencies may or may not yet be networked before this stage is reached. That might be considered another stage.)
6. ***Establish Link between MTTI and Macro Policy.*** So as to speed up the transfer of the entire trade database, MTTI and Macro Policy must develop the programs, telecommunications procedures and test out a system allowing MTTI to download all macro data it is interested in.

For a full-blown set of links between MTTI headquarters (i.e., the three divisions in that building) and three outside agencies creating a WAN, the stages would be:

1. ***Provide limited email service to all MTTI staff.*** Establish email accounts on the network for all personnel in all three agencies, all three divisions and administration throughout the Ministry. Those within the ministry headquarters will have access to email whenever they are in the building and logged into the network. Each outside agency will have one PC and modem dedicated to this service. Outside agencies' staff will walk to this PC, dial into the MTTI headquarters server, check their account for new messages, leave any other messages they like, and then disconnect so that others may use it.
- Network each outside agency.*** Install Novell Netware, cables, and connect all PCs to server to create a network in GEPC, GO-INVEST, and the Standards Bureau.
2. ***Install modems on each network to facilitate regular dial-up contacts for email.*** Allow users in outside agencies to use their own PC and the network's communications equipment to dial up to the MTTI headquarters network and do email.
3. ***Develop the WAN.*** This requires full-time links on leased or dedicated lines. It also means installing complicated user account tracking methods, multi-point hardware, and a variety of very specialized communications and inter-networking hardware and software.

Due to other pressures on MTTI computer staff, it is recommended the first stage of their WAN be postponed. MTTI should install its network and be sure it is functioning well for all users in the headquarters building, and at least have the trade database stored on the server before working on email inside their building, much less the elementary telecommunications links with the outside agencies. The project will purchase the necessary modems, communications and email software later in the project: that is after the project is satisfied the network is working well and users on that network can download the trade data for their personal use.

Eliminating Superfluous Elements from the Comprehensive Program and Considering Institutional Capacity to Absorb Expanded or New Systems

Some computer systems examined in isolation (in response to specific needs of an individual office) suddenly appear *superfluous* when considered as part of a comprehensive program. They do not fit in well with comprehensive computerization priorities and developments. These computer systems do not offer much direct benefit to the output of the ministry as a whole or feed directly into anything else. As

such, the benefits of these computer systems are small when compared to their costs. These computer systems become luxuries.

- Within the MoF, the Multilateral Division is a less important office and its proposal to link to multilateral donors seems is rather ambitious and doesn't offer strong benefits.
- The Industry and Enterprise Divisions (within the MTTI and MoF respectively), are not yet prepared to link up computers. The same is true of a link between Industry and the Fiscal and Monetary division at Finance.
- Customs is just initiating their data-entry efforts and although this progress is positive, it is not ready to form links with the Industry Division, GEPC or GO-INVEST.
- Linking the Consumer Division and the Standards Bureau hardly seems worth the effort. The idea is to allow the Consumer Division access to 50 laws on standards. How these laws would be organized so as to allow the Consumer Division to access is not clear, but would clearly require major effort. After all, these standards are printed and readily available.

It also happens that superfluous systems tend to involve offices with a low capacity for absorbing additional computer equipment. The operations of these offices are better left manual or automated in the simplest way possible. For example, the Multilateral and Bilateral Divisions would be best subsumed into the Debt Management Division, as the former's output could be easily handled by a slight expansion of the latter division³. In addition, at least one office--the Standards Bureau--does not adequately use the computers at their disposal, despite training.

Many outside parties are dissatisfied with the data and indicators presently produced by the Statistics Bureau, largely because its staff tends to focus on a range of products that exceed their mandate and are too ambitious. The staff of the Bureau should ignore more "exotic items" such as GIS and portable computers and concentrate upon improving their basic hardware, software and skills.

Relying on Shared Resources

Often one system can be shared among several divisions or agencies. For example,

- ***Back-up generators.*** Several offices in the same building can share a single back-up generator. MoF can purchase one back-up generator to support DPU, Debt Management and Multilateral divisions. (The Bilateral division sits in the next building over: perhaps the back-up generator can be extended to them; or perhaps they can move into the DPU building.) Similarly, MoF can use one large back-up generator for the entire main building, or at least the important computer rooms, including State Planning, Fiscal and Monetary, Enterprise, Macro Policy, DPU's Training Room and the Secretary to the Treasurer's new computer facilities. MTTI will need one large generator to ensure power for the entire building, housing the three divisions plus administration.

³ While, there is no compelling reason to purchase more computers for either office, a good dot-matrix should be purchased to replace the very bad printer of the Bilateral Division as long as it continues to function. Bilateral deserves a better computer if it is to continue functioning, and a few 486es will probably be replaced under this procurement effort, so Bilateral should obtain it.

- **Desk-top publishing.** A single desk-top publishing system could be shared by different MTTI offices. The system could logically be housed at GO-INVEST, as it has staff already trained in desk-top publishing. GO-INVEST would receive the PC, scanner and color laser printers comprising such a system. Proper sharing of the system requires an understanding that GO-INVEST will assist other MTTI offices (Tourism, Consumer Affairs, and the Standards Bureau) in preparing quality publications. Should demand for desk-top publishing rise, other offices could acquire additional systems over the medium- or long-term.

Identifying Additional Funding Resources to Sustain Computerization Over the Medium- and long-term.

Financial support focused on computer procurements have resulted in the installation of important computer systems in select offices. For example,

- The DPU is a product of IDB-funded technical assistance.
- The Customs Department is just coming on-line as part of a large UNCTAD-funded project, and doesn't even seem interested in any assistance from the Ministry of Finance or outside sources.
- The Fiscal & Monetary officers are presently computerizing with ODI assistance.

The Practical Plan (to be implemented under the BEEP project)

Screening the long-term computerization needs of the ministries on the basis of the criteria mentioned above results in a short list of proposed acquisitions. This list is found on pages 35-38. The impact on the various offices is described below.

The *DPU (Accountant General)* already has a large system comprising a minicomputer and three dozen personal computers connected to two different servers. Fourteen of these PCs were originally designated for Guyanese embassies and may be shipped off at any time. The DPU would like to replace this group of computers, but should channel its request to the original donor (Inter-American Development Bank), which is much more familiar with the DPU's automation needs. As a result, there is not much for the BEEP project to address within the DPU. Its machines are recent models and the department is well-run. The DPU's environment is reasonably good, but it has had trouble obtaining clearance for some improvements to the windows and security. The BEEP project could fund the remaining environmental improvements. Installation of a back-up generator, serving the DPU, Debt Management, Multilateral and possibly Bilateral offices in the same and adjacent buildings, should be in the DPU's name.

The *Debt Management Division* has received technical assistance and proven itself capable of running a good operation and maintaining an important database. However, its machines are outdated. The UNIX system is barely adequate, and the personal computers are old or simply not working. The Debt Management Division should acquire almost everything in the ideal plan (except for the DOS / UNIX connectivity software, because the relevant link is a longer-term need.) This includes not only replacements for the UNIX and PC machines, but also a laser printer, a CD-ROM drive to read relevant databases etched on that medium, and a complete scanner system for storing and referencing loan documents. More people on its staff should have advanced training in important skills such as database and C/C++ programming. Some more training is needed on the subject of interconnectivity: this will be

useful in preparing data on the UNIX system for use in other offices. A little training in communication software would be useful, too.

The ***Multilateral Financial Institutions Division*** is a small one which seems to produce its output adequately enough with the 486 computer presently in its possession. Purchasing a modem for links with multilateral agencies around Georgetown is of limited value. The only concern for the BEEP project is the quality of the division's environment (i.e., connect the computer to a back-up generator, get a surge protector, maybe make some adjustments to the electric wiring, and be certain the division has diskette- and other PC-cleaning devices). The division's room is not perfectly clean, but it will do for now.

The ***Bilateral Financial Institutions Division*** has old machinery and an environment that is probably the worst amongst all offices discussed in this paper. However, the division's contribution to the Ministry is so minimal that its need for a computer is superfluous. A better printer should be ordered to assure timely print outs of the reports. Should a spare PC of better quality become available, Bilateral could have it. Its environment should be improved if the division is to continue working there.

The ***Fiscal & Monetary Division*** is in the process of computerizing as part of a technical assistance project funded by the ODI. The division will have 5 up-to-date machines on a network at the end of the process, which will probably serve its needs well. The environment all this machinery will be placed in is another matter, and that should be addressed soon.

The ***State Planning*** computer cell has a mixed set of computers which it manages reasonably well. These computers seem to meet the different demands placed upon the division. State Planning could expand its network to include some of the individual PCs in the Enterprise division, perhaps the PC in the office of the Secretary to the Treasurer, and maybe a PC in the Project Cycle division, so that people operating those dispersed computers would have more data resources available to them. This means not just cables but a new server and an upgrade of the Novell license. Some more Novell Netware training would be good for the system administrators. State Planning definitely needs more UPSes, surge protectors and some improvements to its environment.

The ***Enterprise Division*** has an old PC and much of its work is done on the State Planning's network. The division should have two new state-of-the-art PCs, which, when connected to the State Planning network, would give access to State Planning's printers. The Enterprise Division will not be part of the macro database right away, so there is no immediate need for modem or communications software. The Enterprise Division already has air conditioning in its offices, but the windows deserve some improvement.

The ***Macro Policy Division*** has an ambitious plan to store and analyze considerable amounts of data. An elaborate macro database, linking the Macro Policy Division to several offices for original data is premature, although the BEEP project can finance the beginning of such a system by linking the two main sources of macro data (i.e., the Statistics Bureau and the Bank of Guyana). For now, efforts in the Macro Policy Division should concentrate upon compiling the data and easing access to the data within the division. A small network with 4 powerful PCs and tape drives, CD-ROMs and the like are in order. One of these PCs should be in the minister's office and linked to the Macro server. Both a laser and a high-speed dot-matrix printer should come with this equipment. In addition, telecommunications links will be needed between the division and MTTI to give the latter access to the centralized data source.

The **IRD's DPU** is in the midst of finishing an impressive and well-executed computerized project for processing taxation forms. The DPU already finds itself short of critical equipment, and the BEEP project could cover this by purchasing 4 more PCs and 2 NIC cards. However, a full scanner system and an optical drive seem a bit too elaborate for the BEEP project to address. The DPU need not link to directly to the macro, trade or other systems (and in any case they already have modems.) . The environment at the DPU is in great need of improvement.

The **Secretary of the Treasury** has some modest needs (modest in terms of computer sophistication needed, enormous in terms of volume). The office should computerize its public service files and concession records, for which it needs only a little training and any kind of hand-me-down PCs. The BEEP project need not buy new PCs. The PCs must be housed in a much better location, however.

It is agreed by all parties that the **Customs Department** is already in the midst of a serious effort to computerize its assessment, billing and collection systems. The department does not need any additional assistance from the BEEP project.

The **Statistics Bureau** needs to upgrade its basic hardware, software and user skills, both to improve the quality of its outputs but also to better support a link with the Bank of Guyana's research department. In addition, the Bureau needs to network so as to centralize its data for easy access by the Bank. This implies a server, network equipment and software, and 4 more state-of-the-art PCs to replace old ones. The software must be upgraded. All these improvements entail training in database and communications software, as well as in network administration and maintenance. There is also a large backlog of power protection requirements, and a need to improve the environment. These basic measure are enough to keep the Bureau busy for some time, so it need not concern itself with portable computers for the field, or geographic information systems.

The **Bank of Guyana** is a large institution with many diverse needs which cannot be addressed in this paper or by the BEEP project for that matter. Its computer shortfalls, needs, and desires are so diverse that it would be well served by a comprehensive systems analysis. However, the **Research Department** at the bank is a major source of data for all other offices in the MoF and is of particular interest to the BEEP project. An aim of the BEEP project is to link the Research department with the Statistics Bureau for data exchange of mutual benefit. The BEEP project should therefore assist Research to upgrade its network and acquire more PCs, partly to replace older ones. Some advanced software and printers are in order, too.

The **Ministry of Trade and Industry (MTTI) headquarters** building holds three divisions described immediately below, as well as the administrative, accounting and other general functions of the Ministry. Most computers in that building are old (ancient by computer standards), and are housed in a very poor environment. It becomes imperative to replace all personal computers with state-of-the-art machines and greatly enhance the environment. A network should be set up supporting all three divisions as well as general administration. MTTI's specialized requests which seem well warranted consist of: an accounting package, a public service registry system and a CD-ROM drive to read international databases. Also, a tape drive and software are needed to copy data to be compiled in the Macro Policy division.

MTTI needs to improve communications with outside agencies. Telecommunications compilations plus the demands of other MTTI improvements dictate that they not try to develop a WAN right away.

Modems, communications software and an email package will be purchased for MTTI headquarters and its outside agencies (GEPC, GO-INVEST and Standards) once internal networking and the trade database are well-established, but no one should try to implement this until the headquarters' network and the trade database are both running well.

Otherwise, nothing has been dropped between the ideal and the practical plan, largely because the office has proved itself determined to work with inadequate computers and giving it a new stock of advanced computers is a wise investment.

The **Industry Division** at MTTI seeks a variety of data in its effort to promote the sector. Modern links to other offices to acquire data is a nice idea but is perhaps premature. The division would be better off with a Pentium PC, so that it could use the software and printers of the new Novell network proposed for MTTI. But to fully benefit from the statistical and graphics software off the MTTI network, the Industry Division should get more training in both areas. Industry will be able to download trade data from the network's server.

The **Consumer Division** at MTTI has a very energetic group of computer users, currently struggling with two PC which they have rigged to work as one. They should have state-of-the-art Pentiums. Otherwise they can rely upon the Network for software (especially printers) and printers; and turn to GO-INVEST for any desk-top publishing needs. They would do well to take courses in database management.

The **Tourism Division** at MTTI is an even more eager group than the Consumer Division, and the staff have well demonstrated their determination to work with the most difficult of PCs. They should not only acquire two new PCs, but their own laser and one dot matrix printer as well. Some training in statistical software packages would be useful. The statistical and graphics software on their PCs will be very useful.

GEPC barely has any PCs but should have state of the art computers. The council should acquire 3 more PCs and 3 more printers, and use printer-sharing devices. A desk-top publishing system is not realistic, especially when the council can rely on the system to be installed at GO-INVEST. A tape drive will allow them to read copies from the trade database. The council should also have a modem, Internet account and funds earmarked for the telephone service needed to pursue export opportunities overseas. With the new computers, the environment must be improved.

GO-INVEST has many old PCs and has a demonstrated willingness to use them. It is not unrealistic to replace the 3 current PCs and purchase 2 more, and provide the office with a healthy stock of laser and dot-matrix printers. Most important, GO-INVEST has two staff members with desk-top publishing experience, so it should be given such a system, under the condition that it will support other MTTI divisions with producing quality publications. These two individuals will probably need more desk-top publishing training. GO-INVEST should have a modem to do Internet work. GO-INVEST has proven itself by establishing a World Wide Web page on the Internet, and it is eager to use the Web for promotion and other purposes. It should get an Internet account in Barbados and have funds set aside for the long-distance telephone service.

Finally, **the *Standards Bureau*** has neither an all-important mandate nor much user interest in computers. The Bureau should have a minimum of power protection equipment, printer sharing devices and cables, plus modem and communications software to link with the Ministry.

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Training Requirements

The training needs associated with setting up even this practical plan are significant. In the table below, training needs are broken up in two different categories:

- *basic skills* for line staff such as Windows, word processing and /or spreadsheet software training (It assumed that all line staff and secretaries will get basic skills; the number of individuals requiring more specialized basic skills, such as database or desktop publishing, is indicated in parentheses in the third column of the table.)
- *advanced skills* for computer support staff in areas such as networking, advanced database, telecommunications and the like.

Training Requirements

Office	Training	Rationalization Needed
DPU (Accountant General)	Basic Skills Advanced Skills	Continue In-House Training Continue In-House Training
Debt Management	Basic Skills Advanced Skills	Communications Software DOS - UNIX Interconnectivity Database Programming (one) C/C++ Programming (one)
Multilateral Financial Institutions	Basic Skills Advanced Skills	
Bilateral Financial Institutions	Basic Skills Advanced Skills	
Fiscal & Monetary	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing Database (one) (None required)
State Planning	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing Networking (One introductory, One advanced)
Enterprise	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing (None required)
Macro Policy	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing Networking (One introductory) DOS - UNIX Interconnectivity
IRD	Basic Skills Advanced Skills	Continue In-House Training Continue In-House Training
Sec. to the Treasury	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing Database (one) (none required)
Customs Dept.	Basic Skills Advanced Skills	Continue In-House Training Continue In-House Training DOS - UNIX Interconnectivity
Statistics Bureau	Basic Skills Advanced Skills	Windows, Spreadsheet, Word Processing Database (four) Statistical Software (four) Communications Software Networking (Two Introductory, One Advanced)
Bank of Guyana	Basic Skills	Continue In-House Training

Office	Training	Rationalization Needed
	Advanced Skills	(None required)
MTTI (Headquarters)	Basic Skills	Windows, Spreadsheet, Word Processing Communications Software
	Advanced Skills	Novell Networking (One introductory)
Industry Div. (MTTI)	Basic Skills	Windows, Spreadsheet, Word Processing Database (one) Graphics (one)
	Advanced Skills	Communications Software (None required)
Consumer Div. (MTTI)	Basic Skills	Windows, Spreadsheet, Word Processing Communications Software Database (two)
	Advanced Skills	(None required)
Tourism Div. (MTTI)	Basic Skills	Windows, Spreadsheet, Word Processing Communications Software Statistical Software (one)
	Advanced Skills	(None required)
GEPC	Basic Skills	Windows, Spreadsheet, Word Processing Desk-Top Publishing (One Introductory) Communications Software
	Advanced Skills	(None required)
GO-INVEST	Basic Skills	Windows, Spreadsheet, Word Processing Desk-Top Publishing (Two Advanced) Communications Software
	Advanced Skills	Internet Training
Bureau of Standards	Basic Skills	
	Advanced Skills	

Staffing Needs

Some of the work described in this plan goes beyond training, to hiring new staff with specialized skills capable of implementing their responsibilities quickly. They are:

- **Database Assistant** to work on macro database and manage Macro Policy network.
- **Network Specialist** to assist in managing Macro Policy and State Planning networks.
- **Computer Assistant** at MTTI to help Data Unit Manager in networking, trade database and developing communications links with other offices.
- **Network Administrator** in Statistics Bureau.

All but the first job are permanent positions.

The database assistant's position may grow into a permanent one, depending upon progress developing and expanding the macro database. For the moment, however, the database assistant should be retained on a 15-month contract.

Implementation

This last section of this paper provides an action plan for implementing the practical plan of computer acquisition and installation in the two ministries. The action plan is presented in tabular format and lists the tasks that need to be undertaken to initiate, conduct, and monitor procurement and installation of the basic hardware and software. In addition, the action plan indicates the parties responsible for each task, as well as the time frame projected for completion of each task.

This paper is being completed in the six months of the BEEP project, so the implementation schedule begins under "Month 6." (Coincidentally, that is the six month of the year.) The schedule continues on to the 24th month when the project finishes.

The implementation plan assumes the swift approval of recommendation, after which tenders are prepared; equipment procured, tested and shipped. The computers should be delivered to the projects in September of 1996. In the mean time, improvements to the environment can proceed. Some training can be done, too.

The plan assumes some substantial tasks must be implemented by local contractors. A local (or perhaps regional) team of computer specialists working under a contract should install the PC and UNIX hardware, software, peripherals and power protection equipment. The same applies to networking: installing the server, network operating system, network interface cards, hubs, cables and the like. Much depends upon quick installation, so the local company should have a large enough staff to perform their contracts in all offices within a few months. The computers, peripherals, software and the like should move fairly quickly. Network installation may be fast or slow, depending partly upon the contractor's expertise. Installation of all hardware and software is expected to be complete by late 1996, early 1995. The priority assigned to different offices is reflected in the implementation plan: Macro Policy, Statistics, Bank of Guyana, MTTI Headquarters and associated divisions, followed by others.

A large priority task is the creation of a link for data communications between the Statistics Bureau and the Bank of Guyana Research office. Preparing data for the Statistics Bureau's network should begin as soon as possible. A local (or regional) contractor versed in computers and telecommunications is to assist in building the link between the two offices once the network is working smoothly and some data is ready to transfer.

Priority is also placed upon the macro and trade databases. A database assistant joins the macro database staff about the time the computers arrive. His responsibilities are to assemble the data and make it available to other users in the macro policy office. The database assistant is expected to work closely with MTTI's computer assistant in developing a trade database.

Other tasks are of less priority and can be done later, once the computers and networks are installed. Case in point are the email links between MTTI headquarters and outside agencies. This should not begin until MTTI has a working network and trade database. Even then the outside links must wait and be developed once email is working well within headquarters. Although there is some flexibility, the immediate plan does not even envision full email links to outside agencies until after BEEP is complete.

The Internet link up is a small one and can proceed shortly after equipment arrives and a phone line is established. The public service records and concessions data in the Secretary to the Treasury's office, as well as the MTTI's registry, can proceed once installation is complete, but does require a little some assistance from nearby computer support staff.

Needs Assessment Profiles

The following should serve as a reference for anyone seeking specific information on any particular office's computers. Each "Needs Assessment Profile" covers one office. The office and its location are listed at the top, followed by a brief description of its mandate (i.e. what does this office do?) The profiles have two tables.

The first table in each profile lists their current MIS situation: what hardware and software is presently in their hands? The last column lists their outputs: what do they use their computer systems for?

The second table details the specifications for immediate acquisition. It will serve as a "check-list" in preparing the tenders. This table lists the quantity (where applicable), a description of the item, and its projected cost.

One should not put too much weight on "Estimated Costs." Standard items are easy enough to estimate: Computers, printers, UPSes are sold in large volumes throughout the world at a fairly uniform prices. Other costs, such as a systems analysis, a back-up generator, corrections to windows and doors, or consumables involve uncertainties and are difficult to estimate. In the interest of providing readers with some information, some guesses were made. (Some guesses were more intelligent than others, with a tendency to err on the side of higher costs.) Those estimates involving great uncertainty are marked with asterisks.

Still, many readers must be eager to anticipate the costs. Keeping in mind the uncertainty, especially in the area of environmental improvements and consumables, the following table summarizes all costs:

PC Hardware	US\$ 107,250
Software	101,700
Servers and Networking	37,000
Peripherals	21,700
Power Protection	19,600
Environmental Improvements	168,900
Consumables	21,300
Special	28,810
TOTAL:	506,260

("Special" includes the systems analysis, mixed scanner, Internet, and desktop publishing system.)

Needs Assessment Profile

Entity: Data Processing Unit (Accountant General)

Location: Ministry of Finance (Headquarters)

Mandate:

Handle book-keeping, budget, payroll, general office and training functions for the Ministry of Finance. Payroll functions extends to 20 government agencies outside of the Ministry. Also actively provides basic computer training courses for mid-level staff.

Current MIS Situation:

Hardware	Software	System/Outputs
AS / 400	DB 2/400	Accountant General
6 GB Hard Disk	Netware	Payment Records
8" Diskette Drive	Windows	Gov. Expenditure Rpts
2 6412 terminals	MS Office	"Initial Report"
high-speed dot-matrix printers	Oracle	Cashbook
Novell Network		Budget
1 server (Pentium, 3GB SCSI HD) in DPU		
1 server (Pentium, 540MB SCSI HD) in Training		
3 UPS w 12,000 VA		Payroll (for 20 agencies)
4 modems		Payroll Checks
35 PCs (486, 540MB HD, 16MB RAM, 4mm DAT, CD-ROM, Modem)		Training
35 dot matrix printers		Windows
1 Toshiba laptop		MS Office
10 small standby generators		General Office
Scanner (document processing)		
IBM 37 (decommissioned)		
8 3742-terminals (5 working)		

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Electrical Audit and Adjustments*	100
	Doors, Bars on Windows *	400
	Alarm System *	300
	Cleaning Supplies *	200
	Total Purchase Cost (Estimate):	16,000

* very rough estimate

Observations/Recommendations:

Needs Assessment Profile

Entity: Debt Management Division
Location: Ministry of Finance (Headquarters)

Mandate:

Monitor Public Sector Debt (including Guaranteed Commercial Debt). Produces many reports on transactions, loan profiles, debt services, payments due, arrears, and projective. Also run simulations of different debt management schemes.

Current MIS Situation:

Hardware	Software	System/Outputs
NCR 3300 w/ 1.2 GB HD, 8MB RAM	SCO UNIX	Debt Management
1 NCR (Wyse) Terminal	CS DRMS	Transactions
3.5" Diskette	Word Perfect	Loan Profiles
QIC Tape Drive (but not used: tapes expensive)	Lotus 123	Payment Schedules
FX-1000 high-speed dot matrix printer		Debt Totals, Subtotals
multiport: for connecting terminals or PCs		Debt Service
3 IBM PS/2 , of which 1 386 and 1 286 (one floppy not working)		Payments Due
LQ-1070 dot matrix printer		Projections
UPSs (no surge protectors)		Word Processing

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>UNIX System:</i>		
1	Pentium 120Mhz w/ 2 GB SCSI Hard Drive, 16MBRAM, Tape Back-Up Drive	5,000
<i>Personal Computers:</i>		
3	Pentium 90 PC w/1 GB HD, 16 MB RAM, NIC Card, Windows 95	6,500
<i>Mixed Scanner System:</i>		
1	Personal Computer w/ 1.6 GB Hard Drive	3,000
1	Scanner w/ sheet feeder	1,200
1	Optical Character Recognition Software	150
1	File Compression Software	60
1	Word Processing Software	300
1	High-Capacity Tape Drive x Software	300
1	Laser Printer	800
1	UPS	350
1	Surge Protector	50
<i>Software:</i>		
1	Spreadsheet Software (UNIX)	1,300
1	Tape Back-Up / Restore Software (UNIX)	500
1	Word Processing Software for Windows 95	300

Qty	Item	Estimated Cost (in US\$)
1	Graphics Software for Windows 95	350
1	Database Software for Windows 95	300
<i>Peripheral:</i>		
1	CD ROM Drive	300
1	Modem & Communications Software	350
1	Laser Printer (UNIX)	800
1	Printer Sharing Device & Cables	200
<i>Power Protection:</i>		
1	UPS	300
5	Surge Protectors	250
<i>Improved Environment:</i>		
	Electrical Audit and Adjustments*	100
	Bars on Windows *	200
	Alarm System *	200
	Cleaning Supplies *	200
<i>Other:</i>		
	Consumables (incl. Laser toner cartridges) *	1,500
Total Purchase Cost (Estimate)		24,860

* very rough estimate

Observations/Recommendations:

Needs Assessment Profile

Entity: Fiscal and Monetary Affairs
Location: Ministry of Finance (Headquarters)

Mandate:

Prepare fiscal and monetary reports for the Ministry of Finance, including reports in compliance with IMF requirements. Document fiscal incentives for state-owned enterprises. Supervises Budgeting.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Dell 590 w/ 1GB HD, 16 MB RAM, CD ROM Drive, SCSI	Lotus 123	Fiscal Reports
Tape Back-Up (1995): to be Novell network server	DBase	Montly Reports
1 Dell 590 w/ 365MB HD, 16MB RAM (1995)	Clipper	Quarterly Reports
3 Compaq 486 DX/2s w/425MB HD, 16MB RAM (1995)		Annual Reports
2 IBM PS/2s (on loan)		Reports for IMF
		Monetary Reports

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Improved Environment:</i>		
	Air Conditioning *	1,500
	Electrical Audit and Adjustments *	100
	Doors, Windows, Bars *	400
	Cleaning Supplies *	200
Total Purchase Cost (Estimate)		2,200

* very rough estimate

Observations/Recommendations:

Expanding computers within fiscal and monetary main office. Designing (along with Accountant General's DPU) large system for Budgeting office.

Needs Assessment Profile

Entity: State Planning
Location: Ministry of Finance (Headquarters)

Mandate:

“Project Cycle”: manage all donor-funded projects’ finance, compliance and progress. State Planning computer office (“Ministry of Finance Information System Department”) supports Fiscal Mondtary, Enterprise and Treasury offices’ computer needs.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Dell 486 Server w/ 1GB HD, 16MB RAM (1995)	Novell Netware	Project Monitoring
3 Dell 486 w/ 365MB HD, 8MB RAM (1995)	Alpha 4 database software	Project Spending Rpts
3 "FBM" (2 400MB HD, 16 MB RAM; 2 220MB HD, 8 MB RAM)*		Project Budget Rpts
1 Quantex (very old, not very useful)		Capital Estimates
1 Quantex w/ faulty floppy drive	Lotus 123	Competitive Bidding
1 PS/2 386 400MB HD, 4MB RAM (former server)	Word Perfect	Bid Analysis
2 PS/2 386es 40MB HD, 4MB RAM (former server and problems w/floppy dr)	Excel	
1 COMPAQ 40MB HD, 2MB RAM w/ power supply problems		
3 Laser Jets		
all machines have UPSes, many have stabilizers		

Note: * The 3 FBM units were assembled in-house in 1994 and users experience problems w/ hard drives, floppy drives & I/O cards. Broken and abandoned equipment includes 5 PS/2s, 2 Epson 8086 (workable), 1 IBM XT, 2 HP Laser Jet II, 1 HP Laser Jet III, COMPAQ laptop bay, dot matrix printers, UPSes, keyboards, monitors.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Server:</i>		
1	Server: Pentium 166 PC w/3 GB HD, 32 MB RAM, CD RIM (6x) Drive, NIC Card,	5,000
1	10 - 25 User Upgrade	1,300
1	Hub	1,000
	Cable, Connector... *	200
1	Crimping Tool	100
<i>Software:</i>		
1	Lotus 123 for Windows95 (10-user)	3,250
1	WordPerfect for Windows95 (10-user)	3,000
1	Access for Windows95 (10-user)	3,000
<i>Power Protection:</i>		

Qty	Item	Estimated Cost (in US\$)
1	Large UPS and surge protector for server	650
4	Surge Protectors	200
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Electrical Audit and Adjustments *	100
	Doors, Bars on Windows *	100
	Cleaning Supplies *	300
<i>Other:</i>		
	Consumables (include. laser toner cartridges) *	2,500
Total Purchase Cost (Estimate)		35,700

* very rough estimate

Observations/Recommendations: Provide network adminsitator(s) with more Novell Netware training

Needs Assessment Profile

Entity: Enterprise Monitoring
Location: Ministry of Finance (Headquarters)

Mandate:

Prepare quarterly reviews of the performance of state-owned enterprises for the Minister of Finance, the IMF and DPU. Cash and Accrual reports, as well as monitoring other performance.

Current MIS Situation:

Hardware	Software	System/Outputs
1 IBM PS/2 386w/ 100MB HD, 8MB RAM	Windows Spreadsheet Wpord Perfect	Reviews of SOEs Quarterly Cash/Accrual Statements PSIP Capital Projects Montly Report

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
2	Pentium 120 Mhz PC w/1 GB HD, 16 MB RAM, NIC Card, Windows 95	4,500
<i>Power Protection:</i>		
2	UPS	500
2	Surge Protectors	100
<i>Improved Environment:</i>		
	Electrical Audit and Adjustments *	100
	Windows *	100
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables *	400
Total Purchase Cost (Estimate)		5,800

* very rough estimate

note: will be linked to State Planning network

Observations/Recommendations:

Enterprise division staff very concerned about slowness in reporting process.

Needs Assessment Profile

Entity: Multilateral Financial Institutions Division

Location: Ministry of Finance (Headquarters)

Mandate:

Prepare tabular reports on status of multilateral loans and grants for the Ministry of Finance.
Reports cover project name and number, year, amount, and executing agency.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Dell 486 w/365MB HD, 8MB RAM (1995) UPS (no stabilizer) Epson 1050 (poor condition)	Word Perfect 5.1 MS Works	Tabular Report on Projects by Lender

Note: Division has 1 PS/2 386 which is no longer working.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Power Protection:</i>		
1	Surge Protector	50
<i>Improved Environment:</i>		
	Electrical Audit and Adjustments *	100
	Cleaning Supplies *	50
<i>Other:</i>		
	Consumables *	200
Total Purchase Cost (Estimate)		400

* very rough estimate

Observations/Recommendations:

Needs Assessment Profile

Entity: Bilateral Financial Institutions Division

Location: Ministry of Finance (Headquarters)

Mandate:

Prepare tabular reports on status of bilateral loans/projects for the Ministry of Finance. Reports cover project name and number, year, amount, and executing agency.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Everex Tempo 386 w/80MB HD, 2MB RAM (1992) OKI 393 Printer (very slow and problematic) Stabilizer, (no UPS)	Word Perfect 5.1	Tabular Report on Projects by Lender

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
1	486 "Hand-Me-Down" PC	0
<i>Peripherals:</i>		
1	Dot Matrix Printer	400
<i>Power Protection:</i>		
1	UPS	250
<i>Improved Environment:</i>		
	Air Conditioning *	800
	Electrical Audit and Adjustments *	150
	Doors, Windows *	200
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables	300
Total Purchase Cost (Estimate)		2,200

* very rough estimate

Observations/Recommendations:

Needs Assessment Profile

Entity: Macro Policy Division
Location: Ministry of Finance (Headquarters)

Mandate:

Prepare monthly and special reports on macroeconomic policy for the Minister of Finance. In many senses the "Economic Research" office.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Gateway Laptop (lent by USAID)	Excel MS Word	Policy Reports (with particular emphasis on tables and graphs)

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Server:</i>		
1	Pentium 166 PC w/3 GB HD, 32 MB RAM, CD ROM (6x) Drive, NIC Card,	5,000
1	Novell Netware Operating System (10-user)	1,200
1	Hub	200
	Cable, Connector....	50
1	Crimping Tool	100
<i>Personal Computers:</i>		
2	Pentium 150 PC w/1 GB HD, 32 MB RAM, NIC Card, Windows 95 and Tape Drives	6,400
2	Pentium 150 PC w/1 GB HD, 32 MB RAM, NIC Card, Windows 95	6,000
<i>Software:</i>		
1	Lotus 123 for Windows95 (5-user)	1,600
1	WordPerfect for Windows95 (5-user)	1,750
1	Access for Windows95 (5-user)	1,500
1	FoxPro for Window94 (5-user)	3,500
1	Economic Modeling software (5-user)	1,000
1	Mathematical software for Windows 95 (5-user)	650
1	Statistical software for Windows 95 (5-user)	3,500
1	SINTIA-T (single user)	200
<i>Peripherals:</i>		
1	Modem & Communications Software	350
1	Laser	800
1	High-Speed Dot Matrix Printer	500
<i>Power Protection:</i>		

Qty	Item	Estimated Cost (in US\$)
1	Large UPS & Surge Protector for Server	600
4	UPS	1,000
4	Surge Protectors	200
<i>Improved Environment:</i>		
	Air Conditioning (2) *	1,600
	Electrical Audit and Adjustments *	200
	Doors, Windows, Bars *	200
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables (incl. laser toner cartridges) *	2,000
Total Purchase Cost (Estimate)		40,200

* very rough estimate

(Dr. Frimpong's current machine must be returned to USAID once the above computers are installed.)

Observations/Recommendations:

Construction of Macro Database and the telecommunications links necessary to accomplish that will require the following:

- Contract to supply modems, install software, train live staff in use of telecommunications equipment.
- Contract to program databases on different servers and develop user interface for those in outside offices to access data by telecommunication links.
- Hire a data assistant to compile all desired data in a central location.
- Either data assistant must have Novell training; or the Division must hire a trained Novell network administrator; or perhaps the State Planning or DPU network administrators can be shared with another department.

Needs Assessment Profile

Entity: Inland Revenue Department
Location: Ministry of Finance Outside Agencies

Mandate:

Lamaha Street

Central administration of all internal revenue functions.

Data Processing Unit

Handle tax returns covering personal income, corporate income, property, capital gains and maintain a registry of all tax returns. To date, 1995 and 1996 data have been entered into the registry.

Branch Offices

Process forms and collect tax revenues in the Interior.

LRO (License Registry Office)

Process vehicle registration and collect registration fees (in process of computerizing).

Current MIS Situation:

Hardware	Software	System/Outputs
Lamaha Street		
1 Gateway Pentium Server: 32 MB RAM, 1 GB HD (1996)	Novell Netware	Administration
8 PCs: mostly Dell & Gateway 486 w/ 8 MB RAM 500 to 750MB HD	Windows	Letters
2 printers (plus 1 coming)	Lotus	Reports
modems	Word Perfect	Database
UPSes (but no stabilizers)	Communication	Files
	Paradox	Reports
	dBase	
Data Processing Unit		
AS/400 w/6 GB HD, Tape Drive (1993), w/ dumb terminals	Novell Netware	Tax Processing
2 printers (one more expected)	Windows	Biweekly reports
1 Gateway Pentium Server: 32 MB RAM, 1 GB HD (1996)	Lotus 123	Monthly reports
15 PCs: mostly Dell & Gateway 486 w/ 8 MB RAM 500 to 750MB HD	Word Perfect	Quart'ly reviews
4 printers (plus printer in repair)		Check Refunds
6 PS/2 s (old, used mostly for training)		
Branch Offices		
Each branch office has 3 offices, each with one PC. Total all three branches:	Windows	Tax Processing
3 PC	Windows	
3 printer	Word Perfect	
3 Stabilizer		
3 UPS		

Hardware	Software	System/Outputs
3 modem		
LRO (License Registry Office)		
1 Gateway Pentium Server: 32 MB RAM, 1 GB HD (1996)	Novell Netware	Registry and Assessment Data
7 PCs: mostly Dell & Gateway 486 w/ 8 MB RAM 500 to 750MB HD; many have CD drives (1995/96)	Spreadsheets	Monitoring DPU
2 printers	Word Processing	

Note: IRD/DPU Previously had System 36 and is currently waiting for the installment of a DAT 4MM tape drive.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
4	486 PC w/320 MB HD, 8 MB RAM w/ Windows	7,000
6	NIC Cards	900
<i>Power Protection:</i>		
14	UPSes	3,500
9	Surge Protectors	450
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Air Conditioning *	1,000
	Electrical Audit and Adjustments *	200
	Doors, Windows, Bars *	500
	Alarm System (DPU) *	500
Total Purchase Cost (Estimate)		29,050

* very rough estimate

Observations/Recommendations:

A large office (several offices in one) which has recently initiated or completed several ambitious computer programs.

Needs Assessment Profile

Entity: Secretary to the Treasurer

Location: Ministry of Finance

Mandate:

Maintain Registry covering personnel records of all public servants.

Manage all Tender Board documentation.

Process revenue concessions.

Manage petty cash, petrol purchases and other basic administrative tasks.

Handle procurement of goods and services through competitive bidding.

Current MIS Situation:

Hardware	Software	System/Outputs
1 386 w/365MB HD, 3.6MB RAM w/ color monitor Also access to the computers of the State Planning Division	Word Perfect 5.1	Personnel Registry Maintain and process files Tender Board Maintain and process files Fiscal Concessions Maintain and process files

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
3	"Hand-Me Down" Pcs (486 or 386)	0
1	486 PC w/520 MB HD, 8 MB RAM w/ Windows	0
<i>Software:</i>		
1	Spreadsheet Software	300
1	Database Software Software	200
1	Word Processing Software	300
<i>Peripherals:</i>		
2	Dot Matrix Printers	800
1	Laser Printer	800
1	Printer Sharing Device & Cables	300
<i>Power Protection:</i>		

Qty	Item	Estimated Cost (in US\$)
5	UPSes	1,250
5	Surge Protectors	250
<i>Improved Environment:</i>		
	Air Conditioning *	2,500
	Electrical Audit and Adjustments *	200
	Doors, Windows, Bars *	500
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables	500
Total Purchase Cost (Estimate)		8,000

* very rough estimate

Observations/Recommendations:

Un-computerized except for secretary serving the chief of this office.

Eager to acquire photocopies, too.

Needs Assessment Profile

Entity: Customs Department
Location: Ministry of Finance Outside Agency

Mandate:

Responsible for import and export inspection, assessment, billing and collection. Recently implemented computerized customs billing method using ASYCUPA system.

Current MIS Situation:

Hardware	Software	System/Outputs
2 Dell Pentium 64MB RAM, 1GB SCSI HD, DAT Tape Drive, SCO UNIX (1 Active, one Back-Up Unit)	SCO/UNIX	Customs Billing
21 WYSE Terminals	UNIX ABAL	Trade Statistics
17 Okidata 520 Printers (9 pin dot matrix)	ASYCUDA v 2.6	
17 Okidata 591 Printers (24 pin dot matrix)		
2 Dell 486, 365MB HD, 4MB RAM		
16,000 VA UPS, 2 650 VA UPS		
3 Digiboard 16-port RJ-45 port connectors		
PCs used for training and admin:		
1 Gateway 486 w/ 2 x 1GB HD, 32MB RAM**	SCO/E249UNIX + E258	
5 Gateway 486 w/ 340MB HD, 4MB RAM	ASYCUDA	
3 Epson LQ2550 Dot Matrix Printers		
1 Okidata Printer		
2 2KVA UPSes		

**Note: -waiting for QIC tape drive.

Immediate MIS Needs:

The Customs Department is just implementing a new system funded by UNCTAD. I don't believe there is anything we can offer them at this point.

Observations/Recommendations:

Part of CARICOM-wide effort to computerize customs office. On-line since April.

Concern about undervaluation and other fraud leads to hope that computers will illuminate problem areas.

Needs Assessment Profile

Entity: Statistics Bureau
Location: Ministry of Finance Outside Agency

Mandate:

Generate time-series data on national economic trends and performance. Compiles (and estimates) national accounts data.

Current MIS Situation:

Hardware	Software	System/Outputs
1 Gateway 486/337	Word Perfect	Report Generation
1 Gateway 386/33	Lotus 123	Annual Reports
4 Gateway 386/25	Arc/Info (GIS)	Census
3 Gateway 386/16	dBase IV	
2 Laptops	COBOL	
4 PS/2 (286)	SPSS	
2 HP Laser Jet Printers	Windows	
2 Okidata Printers	DBMS	
1 Epson DFX-800 High Speed Dot Matrix Printer	Harvard Graphics	
1 Peripheral Sharing Device	Norton Utilities	
Scanner (for permanent copies)	Anti-virus Software	
Digitizer (for GIS work)	PC Tools	
2 1,200VA UPSes	Brooklyn Bridge	
2 600VA UPSes	Desktop Publishing	
8 400VA UPSes	Ventura Publisher	
10 stabilizers		
15 power strips		

Note: No Back-Up Generators are available.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Server:</i>		
1	Server: Pentium 166 PC w/3GB HD, 32 MB RAM, CD (6x) Drive, NIC Card	5,000
1	Novell Operating System (25 user)	2,000
1	Hub	1,000
	Cable, Connectors... *	400
1	Crimping Tool	100
<i>Personal Computers:</i>		
2	Pentium 133 PC w/1 GB HD, 32 Mb, Tape Drive, Windows 95	6,000
2	Pentium 90 PC w/1 GB HD, 16 MB RAM, Tape Drive, Windows 95	5,000

Qty	Item	Estimated Cost (in US\$)
<i>Software:</i>		
1	Spreadsheet Software for Windows 95 (10 user)	3,250
1	Word Processing Software for Windows 95 (10 user)	3,500
1	Database Software for Windows 95 (10 user)	3,000
1	(Another) Database Software for Windows 95 (10 user)	3,000
1	SPSS for Windows 95 (10 user)	3,500
1	(Another) Statistical Software for Windows 95 (10 user)	7,000
1	Mathematical software (10 user)	1,300
<i>Peripherals:</i>		
1	Modem & Communication Software	350
1	High-Speed Dot Matrix Printer	500
<i>Power Protection:</i>		
1	Large UPS and Surge Protector for Server	600
4	UPSes	600
10	Surge Protectors	500
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Air Conditioning *	4,000
	Electrical Audit and Adjustments *	500
	Doors, Windows, Bars *	500
	Alarm System *	300
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables	2,000
Total Purchase Cost (Estimate)		69,000

* very rough estimate

Observations/Recommendations: Statistics Bureau must hire Novell Netware administrator.

Needs Assessment Profile

Entity: Bank of Guyana
Location: Ministry of Finance Outside Agency

Mandate:

Conduct central bank functions, including bank supervision, international settlements, monetary policy, and central government accounts. Produce periodic reports on national debt, capital formation, balance of payments, central budget position, and the like.

Most attention in this report is devoted to the Bank of Guyana's Research Department, which closely studies the nation's economic, financial and monetary trends.

Current MIS Situation:

Hardware	Software	System/Outputs
IBM System 36 Mainframe	JCL	Central Banking Operations
6 terminals	COBOL	Monthly Reports
High-Speed Printer		Quarterly Reports
8 PCs in Novell Network in Research Dept.	Lotus 123	Annual Reports
1 Pentium PC 1 GB HD, 330 MB RAM	Graphics	Balance of Payments
1 Dell 486 PC w/ 520 MB HD, 12 MB RAM	Statistics	Periodic Reports
1 486 PC w/ 125 MB HD, 8 MB RAM		Capital Formation
1 Dell 486 PC w/ 125 MB HDD, 16 MB RAM		Periodic Reports
2 Dell 386 PC w/ 82 MB HD, 6 MB RAM		National Debt
2 PS/2 386 PCs w/ 59 MB HD, 10 MB RAM		Periodic Reports
1 PS/2 386 PCs w/ 59 MB HD, 13 MB RAM		
1 PS/2 8086 PCs w/ 21 MB HD, 640 K RAM		
8 PCs in Novell Network in Human Resources / Information Systems		
1 Dell 486 PC w/ 416 MB HD, 8MB RAM		
1 Gateway 486 PC w/ 416 MB HD, 8MB RAM		
2 Gateway 486 PC w/ 332 MB HD, 8MB RAM		
1 Gateway 486 PC w/ 210 MB HD, 8MB RAM		
1 DTK 386 PC w/230 MB HD, 16 MB RAM		
1 PS/2 386 PC w/ 110 MB HD, 6 MB RAM		
1 PS/2 386 PC w/ 59 MB HD, 9 MB RAM		
Stand-Alones and in Windows for Work Groups (Printers Sharing)		
Network		
1 Multi Media (brand) Plus 486 PC w/ 166 MB HD, 8 MB RAM		
1 Dell 486 PC w/ 540 MB HD, 8 MB RAM		
1 Dell 486 PC w/ 420 MB HD, 8 MB RAM		
1 Dell 486 PC w/ 330 MB HD, 8 MB RAM		
1 Dell 486 PC w/ 240 MB HD, 8 MB RAM		
1 Gateway 486 PC w/ 210 MB HD, 8 MB RAM		
1 DTK 386 PC w/330 MB HD, 16 MB RAM		
1 PS/2 386 PC w/ 59 MB HD, 10 MB RAM		
1 Dell 386 PC w/ 125 MB HD, 8 MB RAM		

Hardware	Software	System/Outputs
1 Dell 386 w/ 120 MB HD, 8MB RAM		
1 Dell 386 PC w/ 83 MB HD, 8 MB RAM		
1 Dell 386 PC w/ 83 MB HD, 4 MB RAM		
1 Dell 386 PC w/ 83 MB HD, 2 MB RAM		
2 Dell 386 PC w/ 83 MB HD, 1.6MB RAM		
2 System Plus 386 PC w/ 82 MB HD, 8 MB RAM		
1 System Plus 386 PC w/ 82 MB HD, 1.6 MB RAM		
1 System Plus 386 PC w/ 82 MB HD, 4 MB RAM		
1 System Plus 386 PC w/ 82 MB HD, 5 MB RAM		
1 CompuAdd 286 PC w/ 42 MB HD, 640 K RAM		
1 NESS 286 PC w/ 42MB HD, 1.0 MB RAM		
3 PS/2 286 PC w/ 30 MB HD, 1.0 MB RAM		
1 PS/2 386 PC w/ 59 MB HD, 1.0 MB RAM		
1 PS/2 8086 PC w/ 21 MB HD, 0.6 MB RAM		
7 Laptops		
1 Bondwell 486 w/ 120 MB HD, 8 MB RAM		
1 Gateway 486 w/ 170 MB HD, 12 MB RAM		
1 Dell 386 w/ 80 MB HD, 12 MB RAM		
1 Latitude 486 w/ 330 MB HD, 8 MB RAM		
1 Latitude 486 w/ 250 MB HD, 8 MB RAM		
2 Compaq 286 w/ 40 MB HD		

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Server:</i>		
1	Pentium 166 Server w/3 GB HD, 32 MB RAM, NIC Card	5,000
1	Hub	1,000
<i>Personal Computers:</i>		
5	Pentium 133 PC w/1 GB HD, 16 MB RAM, Tape Drive, Windows 95	12,500
2	CD ROM Drives	600
4	NIC Cards	600
1	Tape Drive	250
<i>UNIX System (Duplicate of Debt Management):</i>		
1	Pentium UNIX w/ 2 GB Hard Drive, Tape Back-Up Drive	5,000
<i>Software:</i>		
1	Spreadsheet Software for Windows 95 (10-user)	3,250
1	Word Processing for Windows 95 (10-user)	3,500
1	Database Software for Windows 95 (10-user)	3,000
1	(Another) Database Software for Windows 95 (10-user)	3,000
1	Statistical Software for Windows 95 (10-user)	3,500
1	Mathematical Software (10-user)	1,300
1	SINTIA-T (single user)	200
1	Spreadsheet Software (UNIX) (single user)	1,300
1	Tape Back-Up / Restore Software (UNIX) (single user)	500
<i>Peripherals:</i>		
1	Laser Printer	800

Qty	Item	Estimated Cost (in US\$)
1	Dot Matrix	400
1	Modem & Communications Software	350
<i>Power Protection:</i>		
1	Large UPS and Surge Protector for Server	600
4	UPSes	1,000
4	Surge Protectors	200
<i>Improved Environment:</i>		
	Back-Up Generator *	10,000
	Electrical Audit and Adjustments *	500
	Bars on Windows, Alarm *	500
	Cleaning Supplies *	100
<i>Special:</i>		
	Systems Analysis *	5,000
<i>Other:</i>		
	Consumables (include. laser toner cartridges) *	2,000
Total Purchase Cost (Estimate)		65,950

* very rough estimate

Observations/Recommendations:

A very large office with computers used in a wide variety of tasks. Most of paper concentrates upon Research department.

Needs Assessment Profile

Entity: General Administration, Accounting Unit, Registry, and Data Unit

Location: Ministry of Trade, Tourism and Industry (Headquarters)

Mandate:

Administers and provides operational support to Ministry. Handles Ministry accounts, personnel registry, plus functions of Minister and Permanent Secretary.

One person in data processing unit provides technical support for all eight computers located in Ministry's headquarters.

Current MIS Situation:

Hardware	Software	System/Outputs
Data Unit	Lotus 123	
Locally assembled 540MB Hard Drive 4MB RAM	Word Perfect 5.1	
LQ-1170 Printer	Harvard Graphics	
Citizen 120D Dot Matrix (narrow carriage)	Windows	
stabilizer, but no UPS	MS Office	
Accounting		
Comax w/ 540MB HD, 4MB RAM	Lotus 123	
Nec 286 w/45MB HD, .6 MB RAM	Word Perfect	
Samsung 2421 Dot Matrix Printer (very slow)	dBASE	
2 Stabilizers, no UPS		
General Administration **	Word Perfect 6	
IBM PS/2 w/ 44MB HD, 2MB RAM	Word Perfect 5.1	
IBM PS/2, w 40MB HD	Lotus 123	
2 HP Laser Jet III	dBase	
2 UPSes	Utilities	
1 stabilizer	Norton Disk Doctor	

Note: Administration also has 1 BB PC with 42MB HD and 1.6MB RAM, which does not work, and 1 PS/2 with 30MB HD but no monitor.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Server:</i>		
1	Server: Pentium 166 PC w/2 GB HD, 32 MB RAM, CD (6x) Drive, NIC Card	5,000
1	Novell Operating System (25 user)	2,000
1	Hub	1,000
	Cable, Connectors...	250
1	Crimping Tool	100

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
5	Pentium 90 PC w/1 GB HD, 16 MB RAM, Windows 95	7,500
5	NIC Cards	750
1	Tape Drive	250
<i>Software:</i>		
1	Spreadsheet Software for Windows 95 (10 user)	3,250
1	Word Processing Software for Windows 95 (10 user)	3,000
1	Database Software for Windows 95 (10 user)	3,000
1	Statistical Software for Windows 95 (10 user)	3,000
1	Graphics Software for Windows 95 (10 user)	4,000
1	Accounting Software (5 user)	2,000
1	email Sftware (50 user)	10,000
<i>Peripherals:</i>		
2	CD-ROM Drive	700
3	Laser Printer	2,400
4	Dot Matrix Printer	1,600
2	Modem & communications software	700
<i>Power Protection:</i>		
1	Large UPS and Surge Protector for Server	600
5	UPS	1,250
5	Surge Protectors	250
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Air Conditioning *	3,000
	Electrical Audit and Adjustments *	300
	Doors, Windows, Bars *	500
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables (incl. laser toner cartridges) *	3,000
Total Purchase Cost (Estimate)		74,500

* very rough estimate

Observations/Recommendations: MTTI must either train current computer staff in Novell Netware or hire a Novell Netware administrator.

Needs Assessment Profile

Entity: Consumer Affairs
Location: Ministry of Trade, Tourism and Industry (Headquarters)
Mandate: Consumer Protection:

Monitor price and distribution; consumer education information; prepares consumer legislation; consumer research; handle consumer allegations of unfair business practices.

Current MIS Situation:

Hardware	Software	System/Outputs
Compu Rite w/ 42 MB HD, 1.6 MB RAM Raven PR 9012 narrow carriage dot matrix Printer no Stabilizer, no UPS	Word Perfect 5.0 Lotus 123 Harvard Graphics	Consumer Affairs (allaged mistreatment)

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
2	Pentium 90 PC w/ 1 GB HD, 16 MB RAM, Windows 95	5,000
<i>Power Protection:</i>		
2	UPSes	500
2	Surge Protectors	100
<i>Improved Environment:</i>		
2	Air Conditioner *	1,500
	Electrical Audit and Adjustments *	100
	Doors, Windows, Bars *	100
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables	500
Total Purchase Cost (Estimate)		7,900

* very rough estimate

note: Using software & printers from MTTI Headquarters Network

Observations/Recommendations:

Needs Assessment Profile

Entity: Tourism Division
Location: Ministry of Trade, Tourism and Industry (Headquarters)

Mandate:

Promote tourism in Guyana.
Follow tourism trends and prepare monthly bulletin.

Current MIS Situation:

Hardware	Software	System/Outputs
Daewoo 386 SX: not used much, can't boot	Word Perfect	Monthly Report on Tourism (data on visitors)
Samsung 2421 Dot Matrix Printer	Lotus 123	Tourism promotional materials
	Harvard Graphics	

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
2	Pentium Pentium 90 PC w/1 GB HD, 16 MB RAM, Windows 95	5,000
<i>Peripherals:</i>		
1	Laser	800
1	Dot Matrix	400
<i>Power Protection:</i>		
2	UPSes	400
2	Surge Protectors	100
<i>Improved Environment:</i>		
	Air Conditioning *	800
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables (include laser toner cartridges) *	1,500
Total Purchase Cost (Estimate)		9,100

* very rough estimate

note: Using software from MTTI Headquarters Network

Observations/Recommendations:

Needs Assessment Profile

Entity: Industry Division
Location: Ministry of Trade, Tourism and Industry (Headquarters)

Mandate:

Develop nation's industrial policy so as to promote the growth of Industry: support investment initiatives; relevant infrastructure development; follow needs and develop strategies for depressed economic areas; promote the attractive fiscal policy and streamline bureaucracy. Prepare Annual Investment Recommendations.

Current MIS Situation:

Hardware	Software	System/Outputs
IBM PS/2 386 80MB Hard Disk, 1.2 MB RAM Samsung 2421 Dot Matrix Printer (difficult to use letterhead) Stabilizer UPS	Word Perfect Lotus 123	

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
	<i>Personal Computers:</i>	2,500
1	Pentium 90 PC w/1 GB HD, 16 MB RAM, Windows 95	
	<i>Power Protection:</i>	
1	UPSes	250
1	Surge Protectors	50
	<i>Improved Environment:</i>	
	Electrical Audit and Adjustments *	100
	Doors, Windows, Bars *	200
	Cleaning Supplies *	100
	<i>Other:</i>	
	Consumables *	400
	Total Purchase Cost (Estimate)	3,600

* very rough estimate

note: Using software & printers from MTTI Headquarters Network

Observations/Recommendations:

Needs Assessment Profile

Entity: Guyana Export Promotion Council (GEPC)

Location: Ministry of Trade, Tourism and Industry (Outside Agency)

Mandate:

Works with business community and exporters in promoting the nation's exports. Linked to sectoral export and investment promotion agencies. Hosts trade fairs and produces promotional materials.

Current MIS Situation:

Hardware	Software	System/Outputs
None (Pentium PC on order)	Desktop Publishing	Promotion
No stabilizer or UPS	Databases	Product Listing
Back-up Generator	Word Processing	

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
3	Pentium 90 PC w/1 GB HD, 16 MB RAM, Windows 95	7,500
<i>Peripherals:</i>		
1	Laser	800
2	Dot Matrix	800
1	Printer Sharing Device & Cables	200
1	Modem & Communications software	350
1	Portable Tape Drive & Software	300
<i>Internet Link:</i>		
1	Modem & Communication Software	350
1	Telecommunications Link *	1,000
1	Account w/ Internet Provider *	100
<i>Software:</i>		
1	Spreadsheet Software for Windows 95	300
1	Word Processing Software for Windows 95	300
1	email software for Windows 95	500
<i>Power Protection:</i>		
4	UPSes	1,000
4	Surge Protectors	300
<i>Improved environment:</i>		
	Back-Up Generator *	15,000
2 x	Air Conditioner *	1,500

Qty	Item	Estimated Cost (in US\$)
	Electrical Audit and Adjustments *	300
	Doors, Windows, Bars *	400
	Alarm System *	400
	Cleaning Supplies *	200
<i>Other:</i>		
	Consumables (include laser toner cartridges) *	2,500
	Total Purchase Cost (Estimate)	33,000

* very rough estimate

Observations/Recommendations:

Posts things on World Wide Web page, thanks to cooperation of Guyana Embassy in Washington D.C. Concerned to have better access to World Wide Web.

Needs Assessment Profile

Entity: GO-INVEST

Location: Ministry of Trade, Tourism and Industry Outside Agency

Mandate:

Commissioned to promote and facilitate the investment process. Concerned with all investment in Guyana, whether large or small, domestic or foreign. Provides considerable statistical information to all concerned and markets Guyana as an attractive investment climate.

Current MIS Situation:

Hardware	Software	System/Outputs
3 386 PCs not working well**	Word Perfect	Promotion
	Spreadsheets	country information
	Desktop Publishing	business/economic data
	Databases	laws, regulations, incentives, permits, licenses
	Graphics	Web Page

Note: Some work on the World Wide Web is performed by Embassy in DC.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Personal Computers:</i>		
5	Pentium 90 PC w/1 GB HD, 16 MB RAM, Windows 95	12,500
<i>Software:</i>		
1	Word Processing Software for Windows 95	300
1	Spreadsheet Software for Windows 95	300
1	Graphics Software for Windows 95	350
1	Database Software for Windows 95	300
<i>Desktop Publishing System:</i>		
1	Pentium PC w/ 1 GB HD, 30 MB RAM	3,000
1	17" High-Resolution Super VGA Monitor	800
	Software	4,000
1	Color Scanner	1,000
1	Color Laser Printer	7,000
1	UPS	300
1	Surge Protector 50	50
<i>Internet Link:</i>		
1	Modem & Communication Software	350
1	Telecommunications Link *	1,000

Qty	Item	Estimated Cost (in US\$)
1	Account w/ Internet Provider *	100
<i>Peripherals:</i>		
2	Laser Printer	1,600
4	Dot Matrix Printer	1,600
1	Printer Sharing Device & Cables	300
1	Portable Tape Drive & Software	300
<i>Power Protection:</i>		
5	UPSes	1,250
5	Surge Protectors	250
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Air Conditioning *	5,000
	Electrical Audit and Adjustments *	300
	Doors, Windows, Bars *	100
	Cleaning Supplies *	100
<i>Other:</i>		
	Consumables (include laser toner cartridges) *	2,500
Total Purchase Cost (Estimate)		58,100

* very rough estimate

Observations/Recommendations:

Needs Assessment Profile

Entity: Bureau of Standards
Location: Ministry of Trade, Tourism and Industry Outside Agency

Mandate:

Organizes committees to draft product standards legislation. Reports summarizing committees' finding submitted to Standards Council and Parliament.

Handle consumer allegations of unfair business practices.

Current MIS Situation:

Hardware	Software	System/Outputs
3 Pcs 386	Word Perfect Lotus 123	Standards Writing

Note: No back-up generator, stabilizers, UPSs or air condition.

Immediate MIS Needs:

Qty	Item	Estimated Cost (in US\$)
<i>Software:</i>		
1	Email software	500
<i>Peripherals:</i>		
1	Printer Sharing Device & Cables	200
1	Modem & communications software	350
1	Portable Tape Drive & Software	300
<i>PowerProtection:</i>		
3	UPSes	200
3	Surge Protectors	150
<i>Improved Environment:</i>		
	Back-Up Generator *	15,000
	Air Conditioning *	3,000
	Electrical Audit and Adjustments *	200
	Doors, Windows, Bars *	300
<i>Other:</i>		
	Consumables *	500
Total Purchase Cost (Estimate)		20,700

* very rough estimate

Observations/Recommendations:

Appendix I

Descriptions of Specific Computer Systems

This section better explains the systems referred to in the Overall Approach. Specifically, it covers “Mixed Scanner System,” “Desktop Publishing System,” “UPS” and “Surge Protector” as well as “Consumables.” It is a glossary of sorts for short-hand terms used in the body of the text.

Mixed Scanner:

A scanner is a device which looks like a small photocopying machine and allows the operator to create a computerized picture of the image placed on its glass surface. One simply waits for a lens to scan the image and convert it to digital information.

The scanner can produce simple images which are graphic files, often referred to as “Images.” The data comprising these image files are very detailed pictures of the smallest grains of the original on paper. The data required to produce a clear image is large: a single sheet of text scanned at normal resolution would be about one megabyte.

The scanner can also covert the text in the scanned image back into a computer file containing text. This text can be edited. This is done with the aid of “optical character recognition” software, or OCR as it is commonly referred to. The resulting files are simply text, so the OCR file for a normal page of text occupies no more than a few kilobytes.

The project proposes a “Mixed Scanner”: a configuration in which documents are scanned both as graphic images and as OC text. (The term is coined in this paper.) The main purpose would be for a optical character recognition: converting printed pages into computer files containing the corresponding text. The disk space needs are fairly modest. A limited number of original pages could still be scanned if a healthy amount of disk space is provided. The system should allocate one hundred megabytes for OCR text and can easily capture all the words found in twenty five thousand pages worth of documents. One gigabyte would be needed to store one thousand pages of fully-scanned images. Adding a few more hundred megabytes for Windows 95; scanning, tape back-up, file compression and a few other software, a 1.4 to 1.6 gigabyte hard drive should be all that is needed to store a great number of printed paper in text form plus a selected amount of documents in graphic form. A tape back-up drive would be good for safe keeping.

Mixed/Scanner for OCR

1 Personal computer w/ 1.6 GB hard drive	\$ 3,000
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1	Scanner w/ sheet feeder	1,200	
1	Optical character recognition software	100	
1	Tape back-up software	100	
1	File compression software	60	
1	Word processing software	300	
1	High-capacity tape drive	500	
1	Laser printer	800	
1	UPS		350
1	Surge protector	50	

This system costs about six thousand five hundred US dollars. The laser printer could be dropped, and the standard of hard drive changed from SCSI to IDE to reduce the price to a little more than five thousand.

(Such a system would be dedicated to scanning. It should not be used for spreadsheets or graphics software without increasing the hard drive capacity. The only word processing or database work would be directly related to the text stored in the scanned images.)

Such a mixed scanner system is suggested for the Debt Management Division which could develop a small system for copying loan agreements. For the most part, this division only needs accurate photo-like copies of the signature page of each document (and perhaps the cover page.) It also needs to be able to search the text of such documents. In this case an OCR software can convert the printed pages to ASCII text, which can be stored economically.

A few offices have large volumes of paper and want a scanner system to be used as a computerized photocopier. It would offer special protection against the loss, damage or theft of important documents and files. This is an intriguing idea, is impractical because of the sheer size of the scanned images: one megabyte per page. One would find that after four thousand sheets — one file drawer, say — even the largest and most expensive of PC hard drives would be exhausted. It is not feasible for most normal purposes.

Besides requiring large, expensive hard disks, such a system is unattractive for other reasons. Scanning is a rather slow process. An automated sheet feeder could aid matters, but the scan for each sheet is longer than that for a photocopier. And old, torn or wrinkled paper could make a sheet feeder impractical.

Desktop Publishing System:

“Desktop publishing” is a term used to refer to the process of using a personal computer to design brochures, catalogues, newsletters, magazines and other documents of the highest quality. Until recently such systems required several people using a minicomputer and expensive peripheral devices. Now, with the aid of user-friendly software packages, such a system is available on a personal computer, along with peripherals which have become much less expensive. Although a great improvement in terms of ease of use, this requires a certain degree of training and skills.

Several offices at MTTI have expressed a desire to do desktop publishing, as did the Statistics Bureau. (The Bank of Guyana already has one of sorts) The idea is to undertake promotional work: attracting investors, promoting tourism, advertising exports.

A first-class desktop publishing system would comprise the following items:

1	Pentium PC w/ 1 GB HD, 30 MB RAM	\$ 3,000	
1	17" High-Resolution Super VGA Monitor	800	
	Software	4,000	
1	Color Scanner	1,000	
1	Color Laser Printer	7,000	
1	UPS	\$	300
1	Surge Protector	50	

This system costs \$ 15,000 - 16,000. One can replace the color printer with a black and white, and the price would be closer to \$ 10,000 (It might be a good idea to see if color is really needed, and then make that purchase later.)

One would want to purchase not only a good desktop publishing software package, but graphics, image processing, photo touch-up and other software packages: that bill might be an extra thousand dollars or so.

The problem with desktop publishing is that the software is quite difficult to learn. One would normally include a charge for training in a neighboring country or in the United States. Fortunately GO-INVEST actually has two people who have some desktop publishing capabilities already.

This is the idea developed in the Overall Approach section: since trained personnel are scarce and the systems expensive, the project should purchase one system and give it to GO-INVEST. The staff there operating the desktop publishing system would be responsible for producing publishable copies not just for that agency, but for GEPC and the Tourism Division as well. If warranted, one might provide some further training. If demand is too great, more systems can be purchased for other offices, and training provided for their staff in those places.

UPSes

A UPS ("Universal Power Supply," often called a "Power back-up") is in effect a large battery which ensures continued power for ten to fifteen minutes when the city's power supply is cut. The UPS allows users to turn off their machines in an orderly fashion, and thus protect the equipment against hard disk crashes or surges when power returns.

Surge Protectors

A surge protector (sometimes called a "Stabilizer," which is a little different) protects equipment against changes in voltage levels and ensures a regular flow of power. A surge protector often appears similar to a "power strip": a series of plugs on a small oblong housing, but it has some indicator lights signaling when fuses and additional equipment in that strip are running to "smooth out" the power.

(The surge protector should be attached to the wall, the UPS hooked into the surge protector, and the computer equipment connected to the UPS. Laser printers or scanners should

not be connected to the same surge protector or UPS which is connected to the PC. All computers and peripherals should have both a stabilizer and a UPS.)

Consumables:

The idea of consumables is clear enough:

- diskettes
- tapes
- printer ribbons
- toner cartridges for laser printers
- disposable cleaning equipment (diskette cleaners, screen wipes.)

This is hardware, strictly speaking. But each piece's usefulness is quickly consumed and has limited usefulness afterwards: hence the word "Consumable."

The Needs Assessment Profiles simply groups consumables for each office under one heading in the interest of brevity. The different values are rough estimates of the needs. (There is no need to calculate it all out when the exact configurations have not yet been finalized: especially the disk drive types, make of printer, and so on.) The cost of consumables rise quickly when laser printers are added to a purchase, as the toner cartridges cost \$80 - \$100 each (and that is the principle reasons for not purchasing more laser printers.) Similarly, the tapes needed for tape drives raise costs. But the numbers quoted in part 3 are simply rough estimates.

One thing that deserves mention here is that the project plans to purchase the goods in the US and import them under the duty waiver this foreign assistance project enjoys. The project will be able to deliver consumables at one-half to one-third the costs of such supplies in Guyana, maybe even less for some goods.

Needless to say, a good inventory and distribution system must be put in place if the project is to purchase a large quantity of such goods and protect against theft.

Appendix II

Tracing Sources of Macroeconomic Data

The following lists all the indicators which should appear in the “Macro Database”: all the macroeconomic variables which must be compiled and re-compiled regularly to provide the most current data needed to make important policy decisions. This lists the best source of information when constructing this macro database. It is useful in designing the network: which computer systems are really worth linking to, anyway? It should also serve as a valuable source for the programmer asked to come in and develop such a system.

The first column lists the “Indicator,” or macro-economic variable in question. This list came from reports produced by the World Bank. Some of the indicators were abbreviated in this list to conserve space. If the wording for an indicator is not clear, please refer to a World bank document (the table numbers refer to the World Bank reports as well.)

There are two columns called “Original Source” and “Reported Source.” The *reported* source was what was quoted in the World Bank Documents. In many cases the original source is different: that is, one source (e.g. the Bank of Guyana) actually does research and produces a figure which is then sent to another source (e.g. Statistics Department), who then passed the information on to the World Bank. To have a truly efficient and timely system, we want to locate the earliest source.

At present, most of the data is collected and presented annually. The aim of the macro database is to prepare the data quarterly, monthly, or even daily. The expected freshness of the data appears in the “Frequency” - “Desired” column. The current method of reporting appears in the “Frequency” - “Now” column. (As the note at the bottom explains, A is for annual, Q for Quarterly, M for monthly.) Monthly data is often a desire, but may not necessarily be obtainable.

Everything must be taken with a certain grain of salt. I investigated these things closely, but it was difficult to get definite answers on certain things. Respondents sometimes were very hesitant to state unequivocally from where certain data came from. If the reader has good reason to think that a different source is the original, they are probably correct.

Please understand that “Derived” source may not always be what it seems. It is usually from conjecture: which indicators are totals (or ratios) of other numbers. In some instances it may appear after closer study that one of the components is actually the residual derived from the total and other related indicators empirically acquired.

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Appendix III

Tracing Sources of Trade Data

The following lists indicators which will appear in the “Trade Database”: all the variables which must be compiled and re-compiled regularly to provide the most current data needed to make important trade policy decisions.

The structure of the tables is similar to that of the macroeconomic data in the previous appendix.

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Appendix IV

Current Inventory

The following pages list the current computer systems in place. The list is organized according to different offices (divisions, departments, units, bureaus, branches, or whatever the different arm of the ministry is called). The first column lists the name of the office in bold type, followed by its purpose and a list of its key personnel. People particularly concerned with computers (or at least management of the office) are listed by name.

The second column lists the hardware, the third column the software commonly used in each office. Where more than one system exists in an office, the hardware and accompanying software are listed together, beginning on the same line.

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Appendix V

Inputs to the Macro Database

The hardware, software and training inputs for the macro database are arranged as follows: the preliminary inputs are listed in the first part, followed by the medium term, and then the longer-term. The longer term needs are intentionally left vague: this is based upon an appreciation of changing needs and a clearer vision once the foundations are laid. For each stage the hardware, software and training needs are listed.

Preliminary

The preliminary needs fall into two groups: those to collate all data on a server for the macro policy division's use; and those for experimenting with one initial link. This is seen as a learning experience: understanding better the nature of data, and the mechanics of data communications in Guyana.

The Macro Policy network is intended to make the all macro data accessible to all users in the Macro Policy division. That entails the following:

- | | | |
|---|---------------------|--|
| 1 | Database Assistant | Computer professional with strong background in database management, database analysis, as well as networking. |
| 1 | Network comprising: | |
| | 1 | Server (Novell operating system, hub, cables....) |
| | 4 | PCs (1 each for Division Chief, Secretary, Database Assistant and Minister of Finance.) |
| | 2 | Tape Drives |
| | 1 | Portable Tape Drive |
| | 1 | Laser |
| | 1 | High-Speed Dot Matrix Printer |
| | 2 | Database Software |
| | 2 | Economic Software |
| | 1 | Statistical Software |
| | 1 | Mathematical Software |
| | 1 | Spreadsheet Software |
| | 1 | Word Processing Software |
| | plus | power protection equipment, improvements to environment |

(The tape drives are included inside two of the four PCs. One portable tape unit is for visits to other offices. Two database software are specified so as to answer file formatting questions and to ensure ease of use. Two economic modeling packages are specified for increased power of analysis. Each of these software are purchased in 5-user licenses for installation on the network.)

The link between the Statistics Bureau and the Bank of Guyana's Research division entails upgrading the computers in both offices. Of course this is a link, so it involves modems and software. In the case of Statistics, the upgrade also implies networking and consequently training.

Bank of Guyana	1	Server (upgrade)
	4	PCs
	1	Modem and Communications Software
	2	Database Software
	1	Statistical Software
	1	Mathematical Software
	1	Economics Software
	1	Tape Drive
		Printers, power protection equipment....
Statistics	1	Server (Novell, Hub, Cables...)
	4	PCs
	1	Modem and Communications Software
	2	Database Software
	2	Statistical Software
	1	Mathematical Software
	1	Tape Drive
		Printers, power protection equipment....

All these systems are based upon Windows 95 operating system.

A telephone line must be arranged.

The tape drives will help supply the macro policy division with data for their system.

A contract with a local computer / communications firm must be arranged for and should specify supply of modems and data communications software, training to staff in both offices, and development of a user friendly interface for exchange of data sets the two offices are eager to borrow from one another.

Statistics must hire a network administrator person conversant in Novell operating systems to manage their network. Other staff deserve training in Novell to support the system in the administrator's absence, but more importantly to master database and statistical software. Again, the point is to link the two offices, so training in data communications is required.

Medium Term Plan

The medium term plan envisions dial-up telecommunication links as follows:

Macro Policy to Statistics
 Macro Policy to Bank of Guyana (Research)
 Macro Policy to Inland Revenue

Another link between the Macro Policy Division and Enterprise Division is needed. That link involves simply communicating between two Novell servers and can essentially be established by putting two cables together. Someone with a good command of Novell may do this work in a day, but the network administration staff already in place should be able to do this well by themselves.

The main inputs at this stage are simply acquisition of a telephone line in the Macro Policy office, a modem and software. The database assistant should obtain some training in data communications and then share it amongst other macro policy staff. (By the time the link is established, the Bank Statistics and Inland Revenue will already have the necessary hardware and software, and be conversant in communications software.)

Longer-Term

The longer term plan attempts to first establish dial-up communications between Macro Policy and the two UNIX systems:

Macro Policy to Debt Management
Macro Policy to Customs

This can be complicated as it involves connections between two different operating systems. At the very least it requires the following in each office:

Macro Policy	1	DOS/UNIX Interconnectivity Software
Debt Management	1	Modem and Communications Software
	1	DOS/UNIX Interconnectivity Software
Customs	1	Modem and Communications Software
	1	DOS/UNIX Interconnectivity Software

More important, this requires a contract with a networking and data-communications specialist with experience linking DOS and UNIX systems.

Most important of all, training is required for at least one person in each of the three departments on the software (and possible hardware) needed to make these connections:

Macro Policy	Training in DOS/UNIX Interconnectivity Software
Debt Management	Training in DOS/UNIX Interconnectivity Software
Customs	Training in DOS/UNIX Interconnectivity Software

In the longer term, the goal is to have on-line (as opposed to dial-up) access between all offices: a wide area network providing data to anyone effortlessly, as if it were on one's own personal computer. This is very long-range, and technologies will change. The different possible configurations are numerous. The most important thing is that a committee meet and come to an agreement on the nature of such a WAN. Such a system will certainly require leased lines from the public carrier, although laying cable between offices is an option. Routers would presumably

be in place. Gateways may be needed for traffic between different communications protocols. WAN software, hardware, and specially-designed modems are other possibilities.

Stratagem for “Handing-Down” Computers

The general aim of the project is to replace most of the outdated equipment with new, top-of-the-line equipment. Most offices deserve systems better than they have now. However, some offices (e.g. Secretary to the Treasury) are only beginning to computerize. Others (e.g. Bilateral) may not warrant an expensive Pentium machine, but their equipment still lags (technologically speaking) behind some of the equipment other offices will be replacing.

The idea developed here and mentioned several places in the “Overall Approach” is to “hand down” some of the older equipment being replaced to offices really far behind in terms of computerization. This will serve the needs of those offices doing data-entry or other less-demanding tasks. And it will save funds.

The question naturally arises: how many machines will be handed down, and where are they coming from? Actually, there is a good deal of flexibility involved here, not least because there are many PCs being replaced. The exact process of transferring computers will depend upon any modifications to the above “Practical Plan.” It also depends upon the willingness of some parties to part with their older equipment, and of others to accept it.

Nonetheless, it is useful to look at the following table and get some sense of what this process involves. A similar blank copy should serve as a convenient work-sheet on which to plan the final process.

One might ask “How many computers are being replaced?” The answer lies in the first part of the accompanying sheet. A total of 28 PCs will be replaced by new state-of-the-art Pentium computers. Most of these are 286 and 386 computers. Only three of these are 486es.

(The computers are listed with the most powerful, most technologically advanced computers at the top. The numbers refer to the chips, but really embrace successive generations of computer technology. The 486es were the most advanced until two or three years ago, when Pentium computers began to appear. No Pentiums are being retired.)

The second column in the top part is entitled “Handed Down”: this means the number of machines already scheduled to be moved to other offices for data-entry or other simple tasks.

The last column shows the excess, or surplus computers after old ones have been replaced and some recycled to other offices. No 286es or 8086 machines are scheduled for use elsewhere.

These excess machines can be allocated to any purpose one desires. One person has suggested they be put in a training room. That is a good idea, although one must appreciate that one can not teach Windows software on these machines. More data-entry is another possibility. One might want to transfer these machines to offices somewhere in the interior. Keeping a stock of computers to “cannibalize” for spare parts might be the wisest idea. Of course, some of the

computers listed to be replaced could be retained (i.e. they should perhaps be listed under “New Equipment: Expansion” rather than “Replacement Equipment”: see “Upgrading and Expanding the Computer Equipment” in the Overall Approach.) Or perhaps the ministries would prefer to donate them to a school or worthy cause.

To understand exactly which computers would be allocated where, one can refer to the “Details by Office” section below. In the middle columns, the number of machines to be replaced by new acquisitions appears according to each office. This is “Hand-*ing* Down”: the offices are passing the computers on to be distributed elsewhere. (Where exactly is not really their concern.) For instance, the Debt Management division will be retiring two 386 PCs and two 286 PS/2 computers. The totals of each type appear at the bottom, and should be the exact numbers one sees under “Replacing” on the first half of the page.

(Note: the 486es being retired in State Planning and in the Bank of Guyana are actually functioning as servers. Removing a few circuit boards, re-formatting the disk and other modifications will convert these machines into good standard PCs.)

The right-hand columns show where these computers will be installed.

MTTI headquarters will use one machine for their registry. The same applies to three more machines in the Secretary to the Treasury’s efforts to computerize their own public service records. The Secretary to the Treasury’s concessions department will be doing slightly more demanding work, so they should acquire a 486 machine, as should the secretary.

There is still one 486 available. I suggest it be passed on to the Bilateral division (on the condition they correct their environment.)

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Appendix VII

Protecting the Computer Environment

The current situation in which the computers at the ministries are housed, and the electrical supply affecting them are simply deplorable. There is little point in purchasing any computer equipment if it is not placed in a better physical environment, for otherwise it will quickly deteriorate and expire. Steps must be made to ensure the computers are installed in clean (and secure) rooms, are protected against electrical irregularities, and a thorough cleaning schedule is maintained.

The physical environment in which the computers are housed is shocking. With few exceptions, the equipment is used in very open rooms, exposing the computers to dust. Some rooms are not even air-conditioned, exposing the machines to heat and humidity, which can cause equipment to overheat or accumulate mold (yes, mold.) In many cases the equipment is kept in a very cramped place, with wires and cables placed in less than optimal conditions, raising the likelihood that something will be knocked over and put out of commission.

One of the most important things in the environment is the exposure to dust. Computers have microscopic components and it is the smallest particle of dust which can cause the greatest damage. Of course it is impossible to completely rid any environment of dust, but some basic steps can greatly reduce the risk of this menace. The most obvious steps are the windows, which must be well-sealed and single-pane, rather than the paneled windows which have many gaps permitting dust. Carpets should be removed so as not to trap dust. A system of different doors creating an ante-chamber trapping dust would be good to place in rooms housing a series of computers.

And of course the floors should be mopped regularly, table tops and corners dusted. (A regular dusting, sweeping and mopping routine is of course already maintained, but it should be stringently applied in computer rooms: perhaps mopping morning and evening while other rooms are mopped only in the morning.) Where particularly sensitive equipment is in place, it might be good to house that in a large, well air-conditioned closet.

Certain rules must be in place. Bans on drinking, eating and smoking should be put in place (as they appear to be already.) The ban could be extended to applying make-up or combing hair. Files and papers not immediately needed should be moved to other rooms. Removing shoes is a particularly effective (if perhaps culturally difficult) method to minimize the dust which enters different spaces, but could be put into practice in spaces housing critical equipment.

Air conditioning is needed. It provides filtered ventilation in a sealed environment. This helps cool the equipment and reduce the humidity. It is best to place the air-conditioner some distance from the computers, because the blast of air can sometimes shake the chips and cause system failures. Placing the air conditioner near the ceiling is ideal.

The condition of the electrical protection is of the utmost urgency. Most of the ministries' equipment has either a surge protector or a UPS, but very little has both. The surge protector is

sometimes called a “Stabilizer” and protects equipment against changes in voltage levels and ensures a regular flow of power. A surge protector often appears similar to a “power strip”: a series of plugs on a small oblong housing, but should have some indicator lights signaling when fuses and additional equipment in that strip are running to “smooth out” the power. A UPS (“Universal Power Supply,” often called a “Power Back-Up”) is in effect a large battery which ensures continued power for ten to fifteen minutes when the city’s power supply is cut. The UPS allows users to turn off their machines in an orderly fashion, and thus protect the equipment against hard disk crashes or surges when power returns. The surge protector should be attached to the wall, the UPS hooked into the surge protector, and the computer equipment connected to the UPS. (Do not, however, connect laser printers or scanners to the same surge protector or UPS connected to the PC.) All computers and peripherals should have both a stabilizer and a UPS.

While stabilizers protect against surges and UPSes protect against power supply failures, no device can shield much against the damage caused by “Spikes.” “Spikes” are sudden but high disruptions in power: rises to 500, 1000 or even more volts (or similarly dramatic drops) for brief instants. (Surge protectors typically provide protection against ± 20 volts changes: the sort of more common fluctuations found in any electrical supply.) Repeated spikes can burn out equipment. But it only takes one spike to damage data on a hard disk. Spikes may be caused by sudden disruptions in the power utility’s network. But the more common cause of spikes are interference from other equipment, be it rather heavy electrical machines (e.g. elevator or printing press) or more commonly medium-sized equipment which tend to consume energy in bursts (e.g. air-conditioners, photo-copiers and laser printers.) A good surge protector can provide some protection against spikes, but this is not considered very effective.

In order to guard the ministry’s equipment against spikes, an electrical audit should be performed to ensure that computer equipment is located on a low consumption “Phase,” along with lamps, telephone switchboards, fax machines, radios, and possibly electronic typewriters. Heavier equipment must be placed on other phases. This may require re-wiring some offices. In some cases heavier equipment can be moved to other rooms. In cases where laser printers are used, a separate phase should be used (or at the very least, the printer should be plugged into a separate source and certainly not into the surge protector.) As with all these recommendations, such measures must be carried out or else the equipment is exposed to such extreme danger. It’s failure is almost guaranteed and raises the question of purchasing the equipment at all.

The most crucial link, upon which the all other prescribed measures depend, is the installation of large back-up power generators. This has an obvious advantage in that it can supply power to equipment over a much longer period than a UPS. This could be crucial for equipment left on overnight. But the greatest advantage is that it can supply power to the air conditioners during any long interruption in the electrical network. This is important, because neither people nor computers can work very long in a well-sealed room: good air supply is needed. Again, an electrical engineer should be invited to do an audit and determine the power requirements, not so much for the low-consumption items such as computers or lights, but the larger equipment such as photocopiers, and air-conditioners. The engineer should of course be informed of all known future purchases of electrical equipment.

Let us review the different environmental measures which should be put in place:

Measure	Purpose
Back-Up Generator	Continued Supply of Electricity Support Air-Conditioners
Air-Conditioner	Ventilation in Sealed Room Cool PC's Lower Humidity
Proper Housing (Sealed Rooms)	Protect Against Dust
Surge Protectors	Regulates Constant Flow of Electricity
UPSes	Immediate Power Supply when Electricity Fails
Re-Wiring, Moving Equipment	Prevent Spikes from Incompatible Equipment
Electrical Audit	Determine Size of Back-Up Generator Plan Re-Wiring, Identify Incompatible Use

This is an integrated program. It is not a plan which can be implemented selectively. The fate of the current or future computer equipment depends upon all steps being implemented. The back-up generator is needed not just to provide continued power, but to supply air-conditioning during black-outs as well. The UPS and surge protector are standard items which will protect the computers in the period between a power failure and a start-up of the generator. The surge protectors provide a smooth flow of 220V electricity to the UPS. The air conditioning is needed for ventilation in a well-sealed room, and of course to keep the equipment cool. The room must be well sealed to provide basic protection against dust, heat and humidity. And the electrical audit is needed to prevent various equipment interference from interfering with others, as well as to estimate the size of the back-up power generators. Each element in this program depends upon another.

There are a some more measures to take note of in addition to the integrated plan discussed above.

One of the simplest yet most effective methods of ensuring the integrity of equipment is to clean the diskette drives. Small kits comprising a styrofoam diskette and cleaning fluids can clean dust out of the bays in which diskettes are inserted. A regular program of cleaning each diskette drive, say once a month, can go a great distance towards ensuring not just the longevity of the equipment but also the smooth flow of work on computers. The same cleaning process should be maintained for tapes and CD drives.

A good quantity of other cleaning materials should be purchased and made part of a regular cleaning schedule. A large quantity of screen-cleaning packets (a small sealed piece of cloth soaked in a fluid) should be purchased. A set of small, battery operated, "keyboard vacuum cleaners" should be used to remove dust from the keyboards on a regular basis. Isopropyl alcohol should be purchased to wash down the keyboards. This alcohol should also be on hand to clean other (especially metallic) surfaces. Q-tips should be purchased to apply isopropyl alcohol to specific hard-to-reach areas.

Some aerosol dusters (a.k.a. “canned air”) and a small computer vacuum cleaner would be good things to purchase. This equipment should be applied to the motherboard and inner workings of the computer every time the machines are opened.

Bars should be placed on the windows (as they have been in the auditor general’s office) to protect against theft, or possible sabotage. The doors of course should be equipped with good locks, perhaps an electronic alarm system.

Of course, all power protection equipment should be 220V (As far as I know, no 110V equipment has been purchased yet.)

To summarize, there are a number of measures which must be implemented to ensure the dependability and longevity of the computer equipment. This includes specific changes to the environment which ensure cleanliness and reliable power supply:

- Back-Up Generator
- Air-Conditioner
- Well-Sealed Rooms
- Surge Protectors
- UPSes
- Re-Wiring, Re-Arranging Equipment
- Electrical Audit

And still there should be a periodic cleaning routine such as the following:

- Clean Diskette Drives, Tape Drives, CD ROM drives
- Clean Computer Screens
- Wash and Vacuum Keyboards
- Vacuum Inner Workings of Computer Whenever Possible

And finally, there is an important security measure:

- Bars on windows
- (Possibly) Alarm System

Together, these measures will maximize the return on a the Ministries’ investments in computers. Without them, the purchase of computers will seem like wasted money.

Linking Computers for Data Exchange: Some Issues

The ideal plan envisions both a “Macro Database” and “Trade Database” to provide quick and convenient access to the most up-to-date indicators the Ministry of Finance and the Ministry of Trade need. The grand vision foresees several offices linked to each other and sharing data. This whole effort is complicated and requires a steady but cautious approach

The practical plan explains how to construct the foundation for such a system over the coming years: specifically, to compile all the data in one computer (the Macro Policy Database), and develop the first on-line telecommunications links (between Bank of Guyana Research Office and the Statistics Bureau.)

The initial stages of constructing the macro and trade databases are complicated enough, but the following stages are even more complex. Much of the underlying difficulty is a result of limitations in computer technology, not least the general inability of different systems to communicate with each other. Different computers are designed, built and configured differently, and therefore used differently. So trying to establish communication between them can be arduous.

It is important to establish some vision of the larger system early on. Once the larger plan is understood and specific technical issues agreed upon, the early developers laying the foundation can proceed on the most direct course towards the larger goal.

The point of this paper is to raise issues which must be discussed amongst the office managers, computer staff and an expert in telecommunications and data communications who will be involved in creating the macro and trade databases. The issues are:

- Output
- Format
- Interface
- Access
- Security
- Connections
- Storage
- Physical Links
- Communications Protocol

Some issues are more general, some more specific. There is a certain degree of overlap, but the paper tries to present each issue as distinct from the other. The idea is to not go too deep into the technical jargon, but rather to make the ideas as accessible to the general reader as possible.

A number of issues deal with the questions of “raw” and “summary” data. The macro and trade databases rely upon computers with large, detailed databases containing raw -- that is original -- data. The raw data is totaled or somehow analyzed to produce different indicators, or

“summary” data. (For example, the customs department will have thousands of import-assessment forms stored upon their computers: that is raw data. The data can be summarized to produced indicators such as “Total Exports.”)

Output

The first thing to discuss is the “output”: how will users see the macro data? There are two output options: viewing summary data, or “down-loading” files.

When viewing summary data, the user (see first illustration) dials into a remote system, passes security and then sees a menu with a choice of screens: screens of summary data. In step 3 of the following illustration they request a screen with certain indicators (e.g. composition of exports for last three quarters.), and the data is flashed to their screen. They view it (step 4), and once satisfied, press a key to indicate they are finished reading it. They then see the menu (step 3) again, which allows them to either view another screen or exit. Choosing exit disconnects them from the remote system and allows them to use their own computer for other purposes.

The most important feature of the summary screens approach is that users merely view the data on screen. They do not “capture” the data electronically for their own use. The summary screen system puts the computer in “terminal emulation mode” to use the jargon. Users can see the indicators and perhaps copy them on to paper by hand, but can not automatically incorporate the numbers in a document or spreadsheet.

“Down-loading” allows the user to capture and store the data for their own use, and while the results are not always user friendly, they are more powerful. In this illustration (“Download Files”) the user dials into a remote system and passes security just as before, but instead of a menu receives a blank screen and a prompt. At the prompt they type a command (step 3). The computer down-loads the files: coverts the data into another file type (step 4), and then transfers the file to the user’s computer.

The advantage of down-loading is being able to work with the data. The data may be in a database file. Or it may be something which can be incorporated in a spread sheet or a word processing document. (This saves the user the extra work associated with summary screens: the trouble of writing figures down and entering data by hand.) The down-load process allows users to acquire raw or summary data, depending upon their needs.

The committee must discuss the two options and make choices concerning what they consider to be best for the Ministries’ needs. “Down-loading” is probably the most useful for serious analytical work, but the less computer-savvy may find it a bit hard to follow or cumbersome. Down-loading should be easier to develop than summary screens.

(We concentrate here upon viewing summary screens versus capturing data files. There are other, less crucial, features of the interface which should be addressed. For instance, the menu system allowing one to request screens is more complicated to develop but easier to use than typing commands. Such a menu system could be adopted to down-loading, or for that matter, a set of commands could be used for viewing summary screens: see interface below.)

{PAGE }

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Format

Assuming the systems are designed to down-load data in files, some file format should be established.

Nowadays many software applications allow one to convert data from one format (e.g. FoxPro) to a few other formats (e.g. Lotus 1-2-3, Excel, and ASCII.) But this represents an extra step in a person's work. Sometimes it becomes necessary to use several software packages to convert files over and over again, in the absence of having data in the preferred file format. This becomes cumbersome, boring and time-consuming.

Some discussion should be held to determine what format the data is currently stored in, and what format end-users prefer. If a consensus can be reached, a single format can be established and the data acquired by the links connecting offices will be easy for all to use.

Some software (e.g. FoxPro) allows programmers to generate files in several different formats. If the source data is stored in such software, perhaps several formats can be served by host systems and the users can simply specify their choices.

Interface

Any computer system linked to another office for the purpose of accessing a database involves dealing with a variety of data needs. The user normally wants some portions of the host computer's data. The user must therefore specify to the host computer system which data set he is requesting. How exactly to specify it and avoid errors is a matter of the interface: what does the user see on the computer screen and how do they specify their choices?

Users can either use a menu or use commands to generate their data. A "menu" is a list of choices sent to the user, probably with a number or a letter preceding each choice. The user chooses the option and types the number of the choice. After that, the computer processes the request.

The alternative to a menu system is a command-based system. The user sees a blank screen and types a "command": a few code-words the computer understands as different instructions. The user presses the enter-key and the computer processes the command. Users must know the commands already.

Menus are easier to understand and use than command systems, but they also are more difficult to program. This is especially true when attempting to write menus to be used by different computers (e.g. a menu system on a UNIX computer for users on remote DOS machines.) Commands are much more straight-forward. Unfortunately, those less experienced with computers will find the command system mysterious and unclear. Command systems are more intimidating for those new to computers.

There is also the question of loops: repeating different steps over and over again or stopping automatically. In the "Summary Screens" illustration the user goes from a menu to viewing the requested screen, back to the menu again until exiting the menu. This is probably

preferred to the “one shot” scheme in the “Download Files” illustration: type a command, transfer file, and automatically disconnect.

Access

The issue of “Access” addresses the question of access to data. It involves issues concerning the timeliness of data, security, and how to develop programs. Two options are “access data summaries” and “database access.”

Under the “access data summaries” scheme, the operators on the host machine develop and run programs to read raw data and produce summaries. The summary data is then placed in a public directory for outside users.

When users (in this case the data assistant working on the macro database) want to acquire data, they dial into the host computer, pass security, and only have access to the summary data. Then they can down-load that summary data to their computer (or view it, depending upon how the output issue is resolved: see above.)

Accessing data summaries offers the advantages of simplicity, speed, and security. The data is already summarized. Users are able to acquire their data quickly. They do not have any access to the raw data, so no unauthorized person can view or harm the original information.

The disadvantage of accessing data summaries is that a user cannot be certain the summary represents the most recent data. The computer system operator may forget to run the program to convert the most recent raw data into summary form, or may have not yet processed the most recent data.

The alternative is to provide “database access” to outside users. In this case the user’s request for summary data triggers a program to read the most recent raw data and produce a new summary (step 2 in “database access” illustration.) The user’s request is completed by down-loading or viewing the data on screen.

The advantages and disadvantages of database access run just the opposite of the first scheme. The advantage is that users can rely upon the system providing the most up-to-date information. The disadvantages of database access start with complications. Programmers must somehow connect their interface with the programs summarizing the data. Reading large databases on each request is slow. And allowing users to somehow access the raw data raises security issues.

There is one final disadvantage to the database access: perhaps the data should *not* be the most recent. That is, the data may be entered but not yet checked and corrected. Perhaps analysts want to “massage” the data before using it in any calculations. Some summary data demand judgment calls that are difficult to incorporate in systematic programs.

Security

The data in the macro and trade databases is intended for the Ministry of Finance’s and MTTI’s use only. It is not to be shared with outside parties. Therefore, a system of passwords

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must be established. Passwords can be broken by the determined hackers, but more complicated password systems can always be established.

page for “Access Data Summaries” – Not Provided By Originating Office

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page for “Database Access” – Not Provided By Originating Office

Actually, one wants further security: restrictions on which resources the user can access. Outside offices should be able to access the host office's indicators and perhaps perform email. Maybe they access the raw data: see "Access" above. But they should not have access to other resources. Outside users should not be able to read correspondence or other documents, print on host computers, and so on. This can be ensured by granting or denying directory and file "rights" to different users.

The committee should discuss its preferred method of administering passwords, and establish some sort of loose standard concerning what files or devices users may access. This is important to network administrators.

Connections

Much of this appendix assumes that users acquire macro data directly from the original source. That is an assumption made largely for ease of reading. In fact, the committee may prefer to centralize all data on one server: the macro database server.

In the case of a "distributed database" (see illustration), users on any system dial into the computer system of the office producing the data. The macro and trade databases actually become a set of several databases spread across different offices around Georgetown.

The distributed database offers a number of advantages in terms of use and some disadvantages in terms of development. Accessing the original source of data helps to ensure one is acquiring the most current data. And network traffic is light: a number of users are probably each dialing into separate host computers and so the competition to connect on to one machine should be limited.

The disadvantage is that an alternate program must be developed on each computer system. Assuming the ministries contract one programmer or data communications expert to do this on all computers, there should not be a great problem. But different developers create different interfaces, and that can be difficult for users.

The "centralized database" creates one comprehensive database on one server. This scheme concentrates all resources and all links in one office: Macro Policy. The database assistant working in Macro Policy regularly links to other computers and down-loads all new data produced by outside offices. The database assistant then converts files, appends others, perhaps generates summary databases, and make them accessible to outside offices. Those in outside offices will then dial into the macro database and choose any data produced by any office.

The centralized database's advantages and disadvantages are the reverse of the distributed one. Centralizing data means everyone is familiar with one link up, the interface provided, and the file format. One person is responsible for all data. On the other hand, the extra step of down-loading raw data from other offices can not be performed regularly enough to ensure timeliness of data. Competition for the macro database server may cause traffic jams on network links. The centralized database places a lot of pressures on one computer and one database assistant.

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page for illustration of distributed databases – Not Provided By Originating Office

page for illustration of “Centralized Databases” – Not Provided By Originating Office

Storage

Within any one office, raw data is entered and compiled in one large database. The question is: how will the data be stored? On a server, on individual PCs, or perhaps somewhere in-between? This is more a question concerning data-entry and networking. But it also relates to the question of providing data to a wider audience on a timely basis.

It seems we have three different possible ways to (a) update data and (b) “serve” it to others: “centralized storage,” “centralized data-entry and storage,” and “redundant centralized storage.” Let us explain each idea in full.

In the first case, “centralized storage” (see illustration), the only thing centralized is storage of data. Users (1) enter data in and maintain databases on their own personal computers. They later (2) transfer that data to a server. A “batch” program takes care of transferring data from the local machine to the server.

The advantage is not working with multi-user data-entry: many people up-dating one computer file at one time. This can be very difficult to do on a personal computer network.

The disadvantages with this scheme are several. A programmer develops and tests “batch” programs to update the latest data on the server. The system relies upon data-entry staff to run this batch program, but that can be unreliable. Automating the batch program raises the risk of transferring data for public consumption before it is ready. Correcting data already stored on the server can be complicated.

In the “centralized data-entry and storage” scheme (see illustration) the users are entering data in a manner similar to mainframes and minicomputers. All data resides on one machine. If a good multi-user database software is provided, more than one user can enter information in one database at any one time.

This is not a bad system; but multi-user software packages are more complicated and tend to over-dominate network resources. It requires better security measures. It may make data accessible to outside users before it can be verified or “massaged.” Constant data-entry by many people increases network traffic and consumes other network resources.

In the third, “redundant centralized” storage scheme, users enter and massage data on the server, but do so in their own directories (or perhaps the directories for a specific project.) Then the computer periodically searches through personal directories and transfers the data found there to a “public” directory other users can access.

Redundant centralized storage has the advantage that running batch commands is simplified. Data is readily and reliably updated. Security is reliable but uncomplicated

Of course there are some disadvantages. Again, data not yet verified or “massaged” immediately becomes public to other users. Constant data-entry by many people increases network traffic and consumes other network resources. Copying all databases doubles the disk space consumed.

illustration of centralized storage – Not Provided By Originating Office

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illustration of centralized data=entry and Storage – Not Provided By Originating Office

illustration: Redundant Centralized Storage – Not Provided By Originating Office

Physical Links

The physical media used to connect the different networks, whether cable — be it RJ45, co-axial, fiber optic — or telecommunications — a dial in (or possibly leased) lines and modems — must be established. Some of the systems are in the Ministry, so it makes sense to use cable. Repeaters may be needed for long cable links.

The necessary “bandwidth” (volume of data per second) must be established before permitting links between offices. This implies measuring the size of the databases to be regularly transferred. This ensures the media supports the inter-office traffic.

Communications Protocol

The necessary communications protocol — the programmer’s “rules of the road” in data communications — must be discussed. TCP/IP is a universal standard and must be used when linking to a UNIX machine. IPX/SPX is an almost equally popular standard because it is used by Novell, which most of the current computer systems are. On the other hand, Novell will have TCP/IP capabilities soon. The choice of a communications protocol should be standardized and will require significant discussion.

Review

The macro and trade databases and the links needed to construct them are as yet undeveloped. This allows the ministries great freedom in selecting the system best matching their needs. These decisions affect not only the ease of use and appropriateness of data offered but also the development required: generally speaking, the easier the use or the more powerful the function, the more difficult development is.

Again, a committee should be formed to discuss these and other issues seriously. The linked macro and trade databases must be tailored to meet the ministries needs best, and the committee must decide upon some basic critical issues. A qualified person in the field of data communications — both databases and telecommunications — must be part of this process. No doubt that individual will provide a different perspective on the above issues and introduce some more.

Appendix IX

Persons Contacted During Visit

Bank of Guyana

Ms. Wendy Hazel, Director of Information Services
Mr. Gobin Ganga, Director of Research
Ms. Leslie Glen, Operations Department
Mr. Dudley Kirton, Senior Supervisor, Internal Audit Department
Mr. Lal, Government Accounts
Ms. Dolly Singh, Deputy Governor

Customs Department (ASYCUDA Project)

Mr. Douglas Allen, Chief Technical Advisor, ASYCUDA Project
Mr. Joe Babooram, UNCTAD Advisor on ASYCUDA
Mr. Brian A. Mearns, Regional Customs Advisor

GEPC (Guyana Export Promotion Council)

Riley C.A. Abdelnour, Chief Executive Officer

GO-INVEST

Dr. Ivor Mitchell, Director

Guyana National Standards Bureau

Ms. Gillian Wylies, Deputy

Internal Revenue Department

Ms. Sandra Khan, Data Processing Unit
Mr. Kurshid Sattaur, Commissioner

Ministry of Finance (Headquarters Complex)

Ms. Rachel Anrade, Data Processing Unit
Ms. Lorene Baird, Head, Fiscal & Monetary Division
Mr. Tarachand Balgobin, Project Cycle
Ms. Louise Bouyea, Senior Economic/Financial Analyst, FMD - Office of the Budget
Ms. Priya Darshanie, Systems Analyst, Information Systems Dept. ("State Planning")
Mr. Donald de Clou, Head, Multilateral Financial Institutions Division
Mr. Dolphin, Bilateral Financial Institutions Division
Mr. Tony Farnum, Senior Systems Analyst Consultant, DPU/MISU
Mr. Austin Fernando, Advisor, Debt Division
Dr. Coby Frimpong, Consultant to Ministry of Finance and CTA, BEEP Project
Ms. Donna Greenwood, Head of Debt Management Division
Ms. Carole Hebert, Secretary to the Treasury
Ms. Kathleen Jackman, Senior Planner, Enterprise Division
Mr. Bharrat Jagdeo, Minister of Finance
Ms. Donna Levi, Bilateral Division
Ms. Mahase Pertab, Chairman, Central Tender Board and Dep. Secretary to Treasury
Ms. Denisse DeSouza, Enterprise Division
Mr. Zahid Rahman, ODI Advisor to Fiscal and Monetary Division

Ministry of Trade, Tourism and Industry

Ms. Lesley Benjamin, Research Analyst (Tourism)
Ms. Sandra Mangre, Data Unit Manager
Mr. Ramgulam, Deputy Permanent Secretary (Industrial Development)
Ms. Tessa Fraser, Director of Tourism
Mr. Pat Thompson, Deputy Chief of Party BEEP Project
Mr. Neville Totaram, Permanent Secretary
Mr. Paul Wharton, Director of Consumer Affairs

Statistics Bureau

Mr. Lennox Benjamin, Chief Statistician

USAID

Mr. Patrick McDuffie, Representative for Guyana
Mr. Daniel Wallace, Program Manager

